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# THE DIPTEROUS GENUS DIOSTRACUS LOEW

## (DOLICHOPODIDAE)

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Since it was first described in 1861 the genus *Diostracus* has long remained a small group peculiar to North America. Some years ago it came to my knowledge that this genus occurs in Japan, and this stimulated my particular interest in this genus on account of its distributional pattern. With the help of many entomologists there have been available for my study a good number of species of the genus collected in Japan and Taiwan in addition to the already described three from North America. A revision of the genus on the basis of these species is here attempted in the hope that it should engage the attention of entomologists in both Asia and America to this interesting genus, since it is quite possible that our knowledge still covers small part of the genus.

### Acknowledgements

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Dr. F. C. Harmston and Dr. J. R. Vockeroth gave me specimens of the North American species.

### Location of the holotypes

The holotypes of the new species described in this paper will be deposited in the Entomological Institute, Hokkaido University (HU), the Entomological Laboratory, Kyusyu University (KU) or the National Science Museum, Tokyo (SM).

### Genus *Diostracus* Loew

**History.** So far as I am aware, the technical history of the genus *Diostracus*, though has more than one hundred years, is brief as given in the following bibliography. Loew's descriptions of the genus and its type-species are excellent, but give no account of certain characters generally adopted by recent authors. Aldrich gives a new definition of the genus, adding some chaetotaxic characters, but his definition is based only on

his species *olga*. (In reality, *olga* differs from the type-species in certain chaetotaxic characters). Becker's definition of the genus is drawn from Aldrich's study. Thus there has been published no detailed re-examination of the type-species, nor authentic definition of the genus based on the characters used by recent authors.

**Bibliography.** Loew, Neue Beiträge zur Kenntniss der Dipteren 8: 44, 1861 [the genus proposed, with the only included species *prasinus* from New York]; ibid., Monographs of the Diptera of North America 2 (Smiths. Miscell. Coll. 171): 120, 1862 [the genus and *prasinus* redescribed]; Osten-Sacken, Catalogue of the Described Diptera of North America (Smiths. Miscell. Coll. 270): 112, 1878 [the genus and *prasinus* listed]; Williston, Manual of North American Diptera, 3rd ed.: 234, 1908 [a key to the genus]; Aldrich, Psyche 18: 70, 1911 [*olga* described from Washington and a definition of the genus given on the basis of *olga*]; Becker, Dipterologische Studien, Dolichopodidae, B Nearktische und Neotropische Region (Abhand. Zool.-Bot. Gesel. Wien 13): 121, 1921 [a definition of the genus; a key to *prasinus* and *olga*]; Robinson, A Synopsis of the Dolichopodidae (Diptera) of the Southeastern United States and Adjacent Regions (Ent. Soc. Amer. Misc. Pub. 4): 108 and 183, 1964 [keys to the genera and *prasinus* and *olga*; Massachusetts, Pennsylvania, Virginia, North Carolina and Tennessee added as localities of *prasinus*]; Curran, The Families and Genera of North American Diptera, 2nd rev. ed.; 225, 1965 [a key to the genus; head of *prasinus* ♂ figured]; A Catalogue of the Diptera of America North of Mexico (U.S. Dept. Agr.): 508, 1965 [the genus and *prasinus* and *olga* included; Vermont added as a further locality of *prasinus*]; Harmston, Jour. Kansas Ent. Soc. 39: 224, 1966 [*mchughi* described from Oregon].

Type-species. *Diostracus prasinus* Loew.

**Diagnosis.** Hydrophorines in Becker's classification. Body medium to large (ca. 3.5-6 mm. in length in ♂; usually larger in ♀). Head broader than high. Vertex slightly concave; vertical bristles directed anteriorly; ocellar tubercles produced, without postocellar setae. Eyes short-pubescent, broadly separated in both sexes. Frons narrowing below. Face broad; transverse suture complete, or if not, indicated by a pair of lateral swellings. Clypeus convex below, on the lateral sides ending above the lower edges of the eyes. Occiput convex, with a pair of postvertical bristles distinct; orbital cilia single, the beard thin to rather abundant, paler in colour. Palpi in ♂ usually extraordinarily enlarged, loosely applied on the proboscis or held even porrect, and in some lights glittering; in ♀ much smaller than in ♂, recumbent on the proboscis, and dull in colour. Proboscis bulky. Antennae short, inserted above the middle of the face; 1st segment with or without dorsal setae; 2nd segment transverse, subapically with a ciliation around; 3rd segment rounded apically and hairy; arista subbasal (subapical in a certain species), quite shortly plumose or practically bare, with the base a little thickened but not articulated.

Mesonotum quadrate in the dorsal view, gently convex dorsally, with a pair of dark bronzy stripes between the dorsocentral rows of bristles; acrostichal setae absent; 5 or 6 dorsocentral bristles, 1 humeral with a few minute hairs almost imperceptible, 1 posthumeral, 2 notopleurals, and 2 supra-alars; 1 sutural and 1 postsutural usually present (both absent in the type-species and another species); minute hairy setae exclusively on front. Scutellum with a pair of marginal bristles, and in most species also with small supplementary setae. Propleuron with a bristle and often also with a few accompanying hairs. Postscutellar area well developed, about as long as the 1st tergite of the abdomen, and nearly horizontal.

Wings elongate, with the 1st longitudinal vein ending in the costa at the basal 1/3 or so of the wings; 3rd and 4th longitudinal veins approached together towards

the apex of the wings, the 4th ending at or behind the apex\*. Anal vein ending far from the margin of the wings; posterior cross-vein beyond the middle of the wings.

Legs long, in ♂ often modified in shape or pilosity; middle and hind coxae without a bristle on the outer side.

Abdomen cylindrical, with 5 entire segments visible; 1st tergite with marginal bristles well developed. In ♂ the 1st or 4th sternite is produced into a prominent process in certain species; the 5th sternite is membranous medially, with a pair of sclerotized flat swellings apically, and 1 or 2 preceding sternites may also have a sclerotized part apicomediately. Hypopygium sessile, with the outer lamellae more or less elongate, and setose. The external phallic organs are the intromittent organ and the sheath of the intromittent organ. The sheath of the intromittent organ is not articulated, but appears to be an extension of the hypopygial capsels; it is an elongate process, which is produced downwards and is invaginated on the posterior side from the base to around the apex, sheathing there the intromittent organ. Between the phallic organs and the outer lamellae the hypopygial capsels are produced below into lateral extensions or ventral lobes, which are various in shape in the species here referred to the genus.

The above definition of the genus is given on the basis of the type-species and the other 15 species studied in the present work. Of them 13 species including the type-species have six pairs of dorsocentral bristles, whereas the other three (*mchughi*; *nakanishii*; *undulatus*) five pairs; the type-species and another species (*saigusai*) are destitute of both sutural and postsutural bristles, whereas a certain species (*undulatus*) only of the suturals. I can not pass lightly over this diversity of the chaetotaxic characters, but it is impossible to divide the species into distinct groups on the basis of the combined chaetotaxic and other characters. The most striking character of the genus is the very considerable enlargement of the palpi in the males, but one exception is made by *mchughi*, in which the palpi are comparatively small. In other characters, however, there is no good evidence to positively exclude this species from the genus. All the species here referred to the genus are uniform in the fundamental structure of the exterior male genitalia, although the genital processes are variable in shape. On the other hand, they are extremely variable in the inner genital processes which occur in the interior of the hypopygial capsels. This time again it is impossible to divide the species into groups on the basis of the inner genital processes, because these processes are too diverse and specific in shape and development.

**Habitats and distribution.** The adult flies of the genus *Diostracus* are found almost exclusively along mountain streams, resting on boulders or on plants hanging over the streams. They frequent the sprayful places of rapid currents or falling waters; sometimes they rest on the wetted and shaded face of a boulder quite near rushing waters. Usually a single individual would be found here and there. It is not easy to catch them, because they are prompt in flying away. They occur within the timber zone; at least I have not yet collected them in the true alpine zone.

It is obviously premature to discuss the distribution of the genus *Diostracus*, but it is very possible that this genus is restricted to North America and the eastern side of Asia. It may be certain that the genus really does not occur in Europe, the best explored part of the world. This genus has been not found in authors who studied

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\* The wings are imagined as extended sideways.

the Dolichopodidae of the Southern Hemisphere. The Asiatic species at hand all come from Japan and Taiwan, but there is no good reason for the absence of the genus in the mainland of Asia\*.

**Generic relationship.** In both North America and eastern Asia we have not any known genus of the family to which *Diostracus* stands particularly close. On the other hand, certain montane genera of the Hydrophorinae inhabiting the Alps and the Caucasus may be related with *Diostracus*: they are *Asphyrotarsus* Oldberg, *Coracocephalus* Mik, *Eucoryphus* Mik and *Sphyrotarsus* Mik. All these genera are identical in the enlarged palpi of the male, which are glittery and loosely applied on the bulky proboscis. It is, however, not possible to make an essential comparison among them, since the genital characters have been not known in detail in the Alpine and Caucasian genera.

#### Key to the species

- 1 (6) Five pairs of dorsocentral bristles
- 2 (3) Femora wholly yellow . . . . . *nakanishii* (♂)
- 3 (2) Legs largely black
- 4 (5) Sutural bristles present . . . . . *mchughi* (♂)
- 5 (4) Sutural bristles absent . . . . . *undulatus* (♂♀)
- 6 (1) Six pairs of dorsocentral bristles
- 7 (10) Sutural and postsutural bristles absent
- 8 (9) Fore coxae and all the femora yellow . . . . . *prasinus* (♂♀)
- 9 (8) Legs wholly black . . . . . *saigusai* (♂♀)
- 10 (7) Sutural and postsutural bristles present
- 11 (12) Scutellum with many small marginal setae in addition to the scutellar bristles . . . . . *genualis* (♂♀)
- 12 (11) Scutellum with 1 or 2 pairs of small marginal setae in addition to the scutellar bristles
- 13 (14) Scutellum with 2 pairs of small marginal setae, the inner pair situated between the scutellar bristles and the outer pair laterally to the bristles . . . . . *tarsalis* (♂♀)
- 14 (13) Scutellum normally with 1 pair of small marginal setae laterally to the scutellar bristles
- 15 (18) First antennal segment with a few setae dorsally
- 16 (17) Fore and middle basitarsi brown at the extreme base . . . . . *kimotoi* (♂♀)
- 17 (16) Basitarsi wholly black . . . . . *olga* (♂♀)
- 18 (15) First antennal segment bare dorsally
- 19 (20) Fore coxae and all the femora yellow . . . . . *flavipes* (♂♀)
- 20 (19) Fore coxae black at least for a greater part
- 21 (24) Femora evidently brown basally and apically
- 22 (23) Wings with the apical section of the 4th longitudinal vein slightly convex forwards or practically straight; fore femora brown, slightly blackened about the middle . . . *antennalis* (♂♀)
- 23 (22) Wings with the apical section of the 4th longitudinal vein gently but obviously convex forwards; fore femora black about the middle . . . . . *yukawai* (♂♀)
- 24 (21) Femora wholly black or practically so
- 25 (28) Wings with the posterior cross-vein oblique, forming a rectangle with the basal section of the 5th longitudinal vein
- 26 (27) Wings maculated, with the basal section of the 4th longitudinal vein nearly twice as long as the apical section . . . . . *fasciatus* (♂♀)
- 27 (26) Wings not maculated, with the basal section of the 4th longitudinal vein ca.  $\times 1.3$  as long as the apical section . . . . . *miyagii* (♂♀)

\* In preparing this manuscript I have received a species of the genus collected in Nepal. This species will be described in another paper.

- 28 (25) Wings with the posterior cross-vein forming an acute angle with the basal section of the 5th longitudinal vein
- 29 (30) First antennal segment ca.  $\times 1.5$  as long as deep . . . . . *inornatus* (♂♀)
- 30 (29) First antennal segment more than twice to almost  $\times 3$  as long as deep . . *punctatus* (♂♀)

### Descriptions of the species

The descriptions are given on the external characters of dried specimens. The width of the face is measured across the narrowest part, and the height of the proboscis is measured below the eyes. The expression "blue-green" is used in a wide sense, including various shades of colour around bluish-green. The male abdominal characters, sternal and hypopygial, based on microscopic slides are not given in the descriptions but are showed exclusively in the accompanying photomicrographs. These photomicrographs of genitalia are not entirely satisfactory as a means of illustration in order to bring out details, but may serve to show the general outlines of main genital processes. The photomicrographs of abdominal sternites may be sufficient to show diagnostic characters.

#### 1. *Diostracus antennalis*, n. sp.

♂. Length, ca. 5 mm.; of the wings, ca. 5.5–6 mm. Face as broad as or slightly broader than the ocellar tubercle, metallic blue-green, with coppery reflections; clypeus well convex below, the apex attaining the level of the lower edges of the eyes. Frons metallic blue-green. Palpi attaining the anterior apical angle of the proboscis, broadened, ca.  $\times 1.5$  as long as broad, rich yellow, in some lights golden-glittering, with brown hairy setae scattered practically evenly. Proboscis ca. 1/2–1/3 as high as the eyes. Occiput grayish pollinose on the metallic blue-green ground; orbital cilia extending fairly below, with lower setae long-hairy and brownish, being comprised in the rather abundant, brownish beard. Antennae brown; 1st segment ca.  $\times 1.5$  as long as deep, dorsally bare; 3rd segment as long as deep, apically obtuse; arista dark brown, terminating in a small compressed lamella.

Mesonotum shining blue-green, with coppery reflections; with grayish pollen on the humeral calli and the notopleural depressions, and with brownish gray pollen on the posterior border; 6 dorsocentral bristles; 1 sutural and 1 postsutural present though small; 2 notopleurals well developed, the posterior slightly smaller than the anterior. Scutellum with a strong blue-green tinge on the dark ground; a pair of tiny setae laterally to the strong scutellar bristles. Pleura with silvery grayish pollen on the dark ground; prothoracic bristle brown or black, with a few hairs quite small and pale in colour.

Wings tinged with brown; posterior cross-vein a little sinuate, ca.  $\times 1.5$  as long as the apical section of the 5th longitudinal vein; apical section of the 4th vein slightly convex forwards or practically straight.

Coxae concolorous with pleura, brownish apically. Fore coxae on the anterior surface with abundant, long, brown hairs on the basal half and with much shorter, delicate, yellow hairs on the apical half. Trochanters brown. Fore femora brown, a little blackened about the middle, with short, delicate, yellowish hairs below, and with 2–4 posteroventral preapical setae. Middle femora brown, blackened on about the middle 1/3, a little depressed above on the blackened part, with short, delicate hairs

below. Hind femora black with a greenish tinge, with the base and apex brown; with a distinct anterior preapical bristle; with abundant, long, soft, yellowish hairs over the broad under surface except on the base and apex, the longest of these hairs are situated about the middle of the femora and longer than the depth of the femora. Tibiae blackened except for the base brown. Fore tibiae with 3 or 4 antero- and 2 or 3 posterodorsal bristles, and below with rather hairy, yet stiff, suberect, short setae on the whole length. Middle tibiae with 3 or 4 antero- and 2 or 3 posterodorsal bristles. Hind tibiae slightly sinuate or practically straight, with 4 antero- and 2 or 3 posterodorsal bristles; long, soft, brown, posteroventral hairs basally to the middle of the tibiae, but not occurring on the base of the tibiae, the longest of these hairs exceed the hairs of the hind femora in length; apical half of the tibiae with shorter posteroventral hairs, and with brown hairs below which are gradually longer towards the apex of the tibiae. Tarsi blackened except for the middle tarsi brown basally. Fore tarsi vested with suberect setae except below, the basitarsus as long as the succeeding 3 segments united (22 : 10 : 8 : 5 : 5), dorsally with a row of bristles, of which several basal ones are short but the others are about twice as long as the depth of the segment. Middle basitarsus as long as the succeeding segments united (32 : 13 : 10 : 6 : 6). Hind basitarsus as long as the succeeding 2 segments united (30 : 19 : 12 : 8 : 6).

Abdomen grayish pollinose, with coppery reflections, and with a green tinge. Basal sternite produced below into an eminent process, which is directed obliquely posteriorly, compressed, black, and in the lateral view broadened apically. Hypopygium black. Outer lamellae quite small, brown.

♀. Length, ca. 5-5.5 mm.; of the wings, 6-6.2 mm. Face slightly narrower than twice the breadth of the ocellar tubercle; face and frons metallic blue-green; clypeus more or less blackened, with grayish pollen. Palpi with coarse grayish-brown pollen, and with black bristly setae. Antennae with the arista not lamellate apically.

Wings with the posterior cross-vein a little convex outwards and ca.  $\times 1.2$  as long as the apical section of the 5th longitudinal vein. Legs approximately same in colour with those of the male, not ornate with particular hairs. Femora all comparatively slender; fore femora with 2 or 3 small posteroventral preapical bristles, and the middle and hind femora with a strong anterior preapical; middle femora with a vestige of the dorsal depression about the middle. Tibiae with 3-5 antero- and 2 or 3 posterodorsal bristles, and with several bristly setae below.

Holotype (♂). Wakasugi-yama, Hukuoka-ken, Kyusyu (22-V-60, T. Saigusa coll.) [KU].

Paratypes (9♂♂, 5♀♀). 3♂♂, 2♀♀, same data with the holotype; 2♂♂, Inunaki-yama, Hukuoka-ken (16-IV-61, Saigusa); 1♀, Hiko-san, Kyusyu (22-V-50, N. Fukuhara); 1♂, 2♀♀, Hiko-san (23-IV-65, Saigusa); 1♂, Kosyo-zan, Hukuoka-ken (24-IV-63, S. Ide); 1♂, Magaributi, Sagara, Hukuoka-ken (11-V-65, Saigusa); 1♂, Kyusui-kei, Kuzyū-san, Kyusyu (28-V-67, Saigusa).

Distribution. Japan (Kyusyu).

## 2. *Diostracus fasciatus*, n. sp.

♂. Length, ca. 5 mm.; of the wings, ca. 6-6.5 mm. Face ca.  $\times 1.5$  as broad as the ocellar tubercle, metallic blue-green, thinly covered with grayish pollen, usually with coppery reflections; clypeus well convex below, the apex attaining the level of the

lower edges of the eyes. Frons dark metallic blue-green, with grayish white pollen medially. Palpi extending beyond the anterior apical angle of the proboscis, about twice as long as broad, deep yellow, in some lights golden-glittering with a slight bluish tinge; some black setae along the mesal margin of the palpi, other setae so tiny as to be almost indiscernible. Proboscis ca. 1/2 as high as the eyes. Occiput grayish pollinose on the metallic blue-green ground; black orbital cilia descending half the eye-height; beard rather abundant, yellow. Antennae dark brown or practically black; 1st segment twice as long as deep, dorsally bare; 3rd segment slightly deeper than long, roundish conical.

Mesonotum shining blue-green, sometimes clouded with coppery stain, with grayish white pollen on the frontal area, humeral calli and notopleural depressions, and with brownish pollen on the prescutellar depression; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; 2 notopleurals well developed. Scutellum dark brown with a bluish tinge, thinly grayish pollinose; a pair of tiny setae laterally to the scutellar bristles. Pleura thickly gray pollinose on the dark ground, with a slight bluish tinge; prothoracic bristle rather hairy, yellow, with a few yellow hairs.

Wings tinged with brown, obliquely fasciated with dark brown apically and subapically, the apical fascia crossing the 2nd and 3rd longitudinal veins, not or scarcely reaching the 4th vein, and the subapical fascia crossing the 3rd and 4th veins, often broken into irregular spots between the 2nd and 4th veins. Apical section of the 4th vein gently convex forwards; posterior cross-vein oblique, slightly convex outwards; apical section of the 5th vein short, ca. 1/3 as long as the cross-vein.

Coxae concolorous with the pleura, with the apex brownish. Fore coxae with abundant, soft, whitish hairs on the anterior surface, these hairs being longest near the base of the coxae. Trochanters brown. Femora with a slight bluish tinge on the thinly pollinose, black ground, with the extreme base and apex brown. Middle femora a little bent up at the middle, somewhat swollen just basally to the middle, with a thick clump of soft golden hairs on the under side of the swollen part, the longest of these hairs are longer than twice the depth of the swollen part of the femora; a row of similar hairs extending from the clump to near the base of the femora. Hind femora slightly curved backwards. Middle and hind femora with a distinct anterior preapical bristle. Tibiae slender and straight, black, with the base brown. Fore tibiae with 3-6 antero- and 2 posterodorsal bristles. Middle tibiae with 3-5 antero- and 2 or 3 posterodorsal bristles. Hind tibiae with 5-8 antero- and 3 posterodorsal bristles all prominent, and with preapicals also prominent; with several bristly setae below. Tarsi black. Fore basitarsus swollen below at the base into a small tubercle and slightly shorter than the succeeding 2 segments united (19 : 12 : 10 : 6 : 6). Middle basitarsus as long as all the succeeding segments united (33 : 12 : 9 : 5 : 5). Hind basitarsus slightly curved up, as long as the succeeding 2 segments united (31 : 19 : 13 : 8 : 8), with many long, rather bristly black setae above except on the apex, and with similar setae below on the apical half, these setae are mostly ca. 1/3 as long as the segment.

Abdomen with a strong blue-green tinge on the dark ground, and with whitish pollen. Fourth sternite produced below into an eminent, compressed, black process.

Hypopygium black, with a large membranous part on the left side below the 8th tergite. Outer lamellae small, thickly ciliated with pale yellow hairs, with a short lobe on the posterior side (or on the dorsal side when the lamellae are imagined as extended

backwards), this lobe is also thickly ciliated with similar hairs.

♀. Length, ca. 5.5-6 mm.; of the wings, ca. 6.5-7 mm. Face ca.  $\times$  2-2.5 as broad as the ocellar tubercle, dark brown, thinly pollinose. Frons dark brown or practically black, slightly tinged with green on the lateral sides, with rather dense whitish pollen medially in some lights. Palpi coarsely gray pollinose, with black setae over the whole surface. Proboscis bulky, ca. 2/3 as high as the eyes. Black upper orbital cilia ending more or less above the middle of the eye-height.

Mesonotum dark brown, sometimes with slight coppery reflections. Wings more darkly tinged than in ♂, with an apical fascia similar to that of ♂, and with a vestige of a subapical fascia across the 4th longitudinal vein. Fore coxae with short, delicate, whitish hairs on the anterior surface. Fore femora slenderer than in ♂. Middle femora slightly bent up about the middle, below with short, delicate, whitish hairs, which are sparse beyond the middle of the femora. Hind femora slightly curved backwards. Fore basitarsus simple. Hind basitarsus slightly curved up, above with bristles except for the apex of the segment, the longest of these bristles are scarcely twice as long as the depth of the segment; below with short bristles on the apical half of the segment. Abdomen with slight coppery reflections on the dark brown ground.

Holotype (♂). Soranuma-dake, near Sapporo, Hokkaido (6-VII-63, S. Takagi coll.) [HU].

Paratypes (30♂♂, 16♀♀). 20♂♂, 11♀♀, same data with the holotype; 3♂♂, 3♀♀, Soranuma-dake (2-VII-61, Takagi); 2♂♂, Soranuma-dake (8-VIII-62, T. Saigusa & Takagi); 1♂, 1♀, Soranuma-dake (12-VII-63, Takagi); 1♂, Soranuma-dake (2-VIII-67, Takagi); 2♂♂, 1♀, Muine-yama, near Sapporo (19-VIII-62, Takagi); 1♂, Teine-yama, near Sapporo (13-VII-59, Takagi).

Distribution. Japan (Hokkaido).

### 3. *Diostracus flavipes*, n. sp.

♂. Length, ca. 4 mm.; of the wings, ca. 5 mm. Face a little broader to a little narrower than the ocellar tubercle, metallic dark blue-green, with coppery reflections, and with pollen in some lights; clypeus well convex below, the apex attaining the level of the lower edges of the eyes. Frons metallic dark blue-green, with pollen medially. Palpi twice or a little more than twice as long as broad, deep yellow, in some lights golden-glittering with a bluish tinge, with rather sparse, dark brown, hairy setae. Proboscis ca. 1/3 as high as the eyes. Occiput pollinose on the blackish ground, tinged with blue-green; black upper orbital cilia descending ca. 1/2 the eye-height; beard abundant, composed of long, yellow hairs. Antennae dark brown; 1st segment twice as long as deep, dorsally bare; 3rd segment as long as deep, apically truncate or roundish.

Mesonotum shining blue-green, with coppery reflections; with whitish pollen on the humeral calli and notopleural depressions, and with brownish pollen on the prescutellar depression; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; 2 notopleurals well developed, the posterior somewhat smaller than the anterior. Scutellum blackish, covered with thin brownish pollen, tinged with green, with coppery reflections; a pair of fine setae laterally to the strong scutellar bristles. Pleura gray owing to thick pollen; prothoracic bristle dark brown.

Wings tinged with brown; apical section of the 4th longitudinal vein slightly convex

forwards; posterior cross-vein slightly convex outwards or almost straight, about twice as long as the apical section of the 5th longitudinal vein, which scarcely extends to the wing margin.

Fore coxae yellow, with long yellow hairs on the anterior surface. Middle and hind coxae concolorous with the pleura. Trochanters all yellow. Femora all yellow. Fore femora below with a row of short, erect setae, this row ending in 3 or 4 posterovenital preapical bristles. Middle and hind femora with a strong preapical. Tibiae more or less blackened except for the base yellow (sometimes entirely yellow). Fore tibiae a little thickened, with 3 or 4 long posterovenital bristles; a posterior preapical as long as these posterovenitals; 2-4 dorsals and 1 or 2 posteriors more or less outstanding but usually shorter than the posterovenitals; setae on the under side suberect for the whole length of the tibiae. Middle tibiae with 3 or 4 antero- and 2 posterodorsal bristles strong, and with 2 bristles below also more or less outstanding (and rather posterovenital in position); strong preapicals. Hind tibiae with 4 antero- and 3 posterodorsal bristles strong and with some bristles below smaller. Tarsi blackened. Fore basitarsus as long as the succeeding 2 segments united (16:9:7:5:5), with short, suberect setae below. Middle basitarsus as long as the succeeding 3 segments united (26:11:8:5:5). Hind basitarsus as long as the succeeding 2 segments united (24:15:10:6:6), with short suberect setae below.

Abdomen little tinged with green on the dark ground, with whitish pollen. Hypopygium black. Outer lamellae comparatively well developed, elongate, ribbon-like in shape, and blackish in colour, with long, brownish hairs.

♀. Length, ca. 4 mm.; of the wings, ca. 5.5-6 mm. Face ca.  $\times 1.5$  as broad as the ocellar tubercle. Palpi covered with coarse brownish gray pollen, with some rather bristly black setae.

Wings with the posterior cross-vein little convex outwards. Fore coxae with black hairs. Fore femora without erect setae below. Fore tibiae with 3 antero- and 2 posterodorsal and 2 posterovenital bristles. Middle tibiae with 3 antero- and 2 posterodorsal bristles strong, and below with several bristles. Hind tibiae with 4 antero- and 2 or 3 posterodorsal bristles strong, and below with several bristles.

Holotype (♂). Kanayama, Sudama, Yamanasi-ken, Honsyu (10-VIII-61, T. Saigusa coll.) [KU].

Paratypes (6♂♂, 2♀♀). 5♂♂, 1♀, Yabusawa (2,700 m. above the sea level), Senzyō-dake, Nagano-ken, Honsyu (28-VII-61, Saigusa); 1♂, 1♀, Tokugō-tōge, Nagano-ken (12-VII-63, Saigusa).

Distribution. Japan (Honsyu).

Remarks. Some paratypes are lighter in the colour of the antennae and the legs, and in two of them the legs are light yellow as far as the first or second tarsal segment.

#### 4. *Diostracus genualis*, n. sp.

♂. Length, ca. 3.5-4.5 mm.; of the wings, ca. 4.5-5 mm. Face about as broad as the ocellar tubercle, metallic blue-green, with thin brownish pollen, the clypeus well convex below, but not attaining the level of the lower edges of the eyes. Frons metallic deep blue-green; vertical bristles much shorter and finer than the ocellars, directed forwards. Palpi ca.  $\times 1.5-2$  as long as broad, dirty brown, in some lights silvery with

a strong blue tinge; with setae brown and scattered practically evenly. Proboscis ca. 1/2.5-1/4 as high as the eyes. Occiput strongly tinged with blue-green, thinly covered with whitish pollen; orbital cilia almost complete, the lowest several setae elongate and brownish, comprising part of the beard, which is rather thin. Antennae dark brown; 1st segment a little less than twice as long as deep, with setae dorsally; 3rd segment as long as deep, apically blunt.

Mesonotum shining blue-green, with bronzy cloud laterally; humeral calli and notopleural depressions with whitish pollen; posterior border of the mesonotum with brownish pollen; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; posterior notopleural somewhat smaller than the anterior. Scutellum dark brown, tinged with blue-green, covered with thin pollen, the margin wholly ciliated with many fine brownish setae, of which the longest are less than half as long as the scutellar bristles. Pleura silvery gray owing to thick pollen, tinged with blue-green; prothoracic bristle brown or black.

Wings tinged with brown; posterior cross-vein somewhat oblique, slightly convex outwards or almost straight, ca. 1 1/2 as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura, slightly brownish in some lights; fore coxae on the anterior surface with brownish hairs fine and delicate except several bristly setae situated towards the base of the coxae. Trochanters yellow or brownish yellow. Femora slender, blackish, with a bluish tinge; with the base and apex brownish yellow; with short, delicate, suberect hairs below. Tibiae blackened, with the base brownish. Fore tibiae with 3 dorsal (or anterodorsal), 2 posterior (or posterodorsal) and 2 posteroventral bristles. Middle tibiae with 3 antero- and 2 posterodorsal bristles well developed, and below with several small posteroventrals. Hind tibiae with 4 or 5 antero- and 2 or 3 posterodorsal bristles well developed, and below with several smaller bristles. Fore basitarsus longer than the succeeding 2 segments united (18 : 9 : 7 : 5 : 5). Middle basitarsus as long as all the succeeding segments united (27 : 10 : 7 : 5 : 5). Hind basitarsus as long as the succeeding 2 segments united (25 : 15 : 10 : 6 : 5).

Abdomen dark brown, laterally with a bluish tinge and white pollen. Fourth sternite apically bent out below in a V-shape. Hypopygium black. Outer lamellae small, black, with brownish hairs.

♀. Length, ca. 4-4.5 mm.; of the wings, 4.5-5.5 mm. Face and frons metallic dark blue-green, often with purplish reflections, and with thin whitish pollen. Face  $\times$  1.5 as broad as the ocellar tubercle. Palpi practically as large as those of ♂, covered with coarse, grayish brown pollen; with setae black, several ones of them situated near the apex of the palpi are much stronger than the others.

Holotype (♂). Wakasugi-yama, Hukuoka-ken, Kyusyu (23-VI-61, T. Saigusa coll.) [KU].

Paratypes (53♂♂, 48♀♀). 1♂, 4♀♀, Hayatine-san, Iwate-ken, Honsyu (4-VIII-64, S. Takagi); 1♂, 1♀, Oze, Gunma-ken, Honsyu (19-VII-50, N. Fukuhara); 1♂, Norikuradake, Honsyu (5-VIII-52, Fukuhara); 5♂♂, 5♀♀, Nakabusa Onsen, Nagano-ken, Honsyu (17-VIII-62, Saigusa); 4♂♂, 3♀♀, Sirouma-dake, Nagano-ken (15~16-VIII-62, Saigusa); 2♂♂, 1♀, Simasima, Nagano-ken (13-VII-62, Saigusa); 6♂♂, 6♀♀, Senzyô-dake, Yamanasi-ken, Honsyu (27-VII-61, 7-VIII-61, 5-VII-63, 10-VIII-63, Saigusa); 13♂♂, 17♀♀, Kanyama, Sudama, Yamanasi-ken (10~11-VIII-61, 30-VI-63, Saigusa); 3♂♂, 5♀♀, Omogo-

kei, Sikoku (6-IX-62, I. Miyagi); 1♂, Nametoko, Sikoku (10-IX-62, Miyagi); 13♂♂, 6♀♀, same data as the holotype; 3♂♂, Hiko-san, Kyusyu (26-VII-65, Saigusa).

Distribution. Japan (Honsyu; Sikoku; Kyusyu).

5. *Diostracus inornatus*, n. sp.

♂. Length, ca. 4.5 mm.; of the wings, ca. 6 mm. Face ca.  $\times 1.5$  as broad as the ocellar tubercle, metallic dark green, with thin brownish gray pollen; clypeus well convex below, the apex extending below beyond the level of the lower edges of the eyes. Frons blackish, tinged with blue-green, medially with brownish gray pollen. Palpi ca.  $\times 2.5$  as long as broad, attaining the anterior apical angle of the proboscis, brown, margined with dark brown, in some lights silvery glittering with a strong bluish tinge; with setae mostly confined on the margin. Proboscis ca. 1/2-1/2.5 as high as the eyes. Occiput tinged with blue-green on the dark ground, and covered with thin white pollen; vertex with brownish pollen. Black upper orbital cilia descending ca. 1/4 the eye-height; beard rather abundant, yellow. Antennae dark brown or practically black; 1st segment ca.  $\times 1.5$  as long as deep, dorsally bare; 3rd segment about as long as deep, apically blunt.

Mesonotum sombre in colour, with a vestige of blue-green, or only partly blue-green, with white pollen on the humeral calli and the notopleural depressions, and with brownish gray pollen on the posterior border; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; 2 notopleurals both well developed. Scutellum slightly tinged with blue-green on the dark ground, with brownish gray pollen; a pair of small setae laterally to the strong scutellar bristles. Pleura silvery gray owing to thick pollen, with the prothoracic bristle and a few accompanying setae all pale yellow and hairy.

Wings tinged with brown; apical section of the 4th longitudinal vein gently convex forwards; posterior cross-vein slightly convex outwards, ca.  $\times 1.5$  as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura. Fore coxae on the anterior surface with abundant, whitish or pale yellow hairs fairly elongate towards the base of the coxae. Trochanters brown; middle and hind trochanters more or less blackened. Femora all plain, with a slight greenish or coppery reflections on the thinly pollinose, blackened ground. Tibiae all slender and straight, blackened except for the extreme base dark reddish brown. Fore tibiae with 2-4 anterodorsal bristles, 1 subbasal and 1 middle posteriors, and several suberect posteroventrals. Middle tibiae with 3 antero- and 2 posterodorsal bristles. Hind tibiae with 5 or so antero- and fewer (about 3 or 4) posterodorsal bristles, and with irregular bristly setae below. Tarsi blackened. Fore basitarsus about as long as the succeeding 2 segments united (19 : 11 : 10 : 6 : 5) and vested below with suberect setae. Middle basitarsus as long as all the succeeding segments united (33 : 12 : 9 : 5 : 5). Hind basitarsus as long as the succeeding 2 segments united (32 : 18 : 12 : 7 : 5).

Abdomen tinged with blue-green on the dark ground, with whitish pollen on the sides. Fourth sternite somewhat bent out below. Hypopygium black. Outer lamellae comparatively large, dark brown, fringed with whitish delicate hairs.

♀. Length, ca. 5-5.5 mm.; of the wings, ca. 6-6.5 mm. Face ca.  $\times 2.5$  as broad as the ocellar tubercle, blackened. Palpi twice as long as broad, covered with coarse, gray pollen, in some lights appearing darker and rather silvery; with setae stronger than

in ♂ and strewn practically over the whole surface except for the base. Third antennal segment slightly deeper than long. Wings darker than in ♂, with the posterior cross-vein about twice as long as the apical section of the 5th longitudinal vein. Legs practically as in ♂.

Holotype (♂). Aizan-kei, Hokkaido (15-VII-60, S. Takagi coll.) [HU].

Paratypes (28♂♂, 23♀♀). 1♂, 4♀♀, same data as the holotype; 13♂♂, 8♀♀, Aizan-kei (17-VII-62, T. Saigusa); 3♂♂, 9♀♀, Sōun-kyō, Hokkaido (10-VII-, 31-VII-, 6-VIII-1960, Takagi); 2♂♂, 1♀, Nukabira, Hokkaido (12-VII-59, 11-IX-60, Takagi); 1♀, Siretoko, Hokkaido (10~17-VII-65, T. Kumata & I. Miyagi); 8♂♂, 1♀, Syokanbetu, Hokkaido (21-VII-64, I. Miyagi).

Distribution. Japan (Hokkaido).

#### 6. *Diostracus kinotoi*, n. sp.

♂. Length, ca. 4 mm.; of the wings, ca. 5 mm. Face ca. × 1.5, or less, as broad as the ocellar tubercle, metallic deep green, with thin whitish pollen; clypeus well convex below, the apex attaining the level of the lower edges of the eyes. Frons metallic deep green. Palpi much enlarged, well produced beyond the anterior apical angle of the proboscis, ca. × 1.5 as long as broad, yellow, in some lights golden-glittering, with small, hairy, brown setae over the whole surface. Proboscis 1/3, or less, as high as the eyes. Occiput tinged with green on the dark ground, covered with grayish pollen; upper orbital cilia represented by about 7 bristly setae, the lower 2 or 3 of these bristles are less thickened and rather brownish in colour; beard rather abundant, brown. Antennae dark brown; 1st segment ca. × 1.5 as long as deep, with a few setae dorsally; 3rd segment as long as or a little shorter than deep, apically blunt or truncate.

Mesonotum shining blue-green, with brownish gray pollen on the humeral calli to the notopleural depressions and also on the posterior border; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; posterior notopleural smaller than the anterior. Scutellum tinged with green on the dark ground, with coppery reflections, and with thin brownish gray pollen; with a pair of tiny setae laterally to the scutellar bristles. Pleura silvery gray owing to thick pollen, tinged with green; prothoracic bristle brown.

Wings tinged with brown; posterior cross-vein slightly oblique, slightly convex outwards or slightly sinuate, ca. × 1.5, or less, as long as the apical section of the 5th longitudinal vein.

Fore coxae concolorous with the pleura, brownish towards the apex, on the anterior surface with many brownish hairs, of which several subbasal ones are much stronger than the other and rather bristly. Middle and hind coxae similar in colour to the fore pair, but somewhat brownish. Trochanters brown. Femora blackened except for the base and apex brown. Tibiae brown, darker towards the apex. Fore tibiae with 2 dorsal, 2 posterior and 1 or 2 posteroventral bristles all rather weak. Middle tibiae with 3 antero- and 2 posterodorsal bristles. Hind tibiae with 4 antero- and 3 posterodorsal bristles, and with some bristly setae below. Tarsi dark brown or blackened, the base light brown in the fore and middle tarsi. Fore basitarsus as long as the succeeding 2 segments united (17 : 9 : 8 : 5 : 5). Middle basitarsus a little shorter than all the succeeding segments united (25 : 10 : 8 : 5 : 5). Hind basitarsus nearly as long as the succeeding 2 segments united (23 : 14 : 11 : 6 : 6).

Abdomen tinged with green on the dark ground, with coppery reflections, and laterally with thin white pollen. Fourth sternite bent out below. Hypopygium black. Outer lamellae rather small, yet well produced below, blackened, ciliated with long, yellow hairs.

♀. Length, ca. 4 mm.; of the wings, ca. 5-5.5 mm. Face a little less than twice as broad as the ocellar tubercle, the clypeus less convex below than in ♂. Palpi much smaller than in ♂, covered with coarse dark brown pollen, with black setae. Wings with the apical section of the 5th longitudinal vein somewhat longer than in ♂, being almost as long as the posterior cross-vein. Legs similar to those of ♂.

Holotype (♂). A-li Shan (2,300 m. above the sea level), Taiwan (6-VII-65, S. Kimoto coll.) [KU]. With the wings in bad condition.

Paratypes (2♂♂, 3♀♀). 2♀♀, A-li Shan (2,300 m.). (5-VI-, 6-VII-65, Kimoto); 2♂♂, 1♀, A-li Shan (2,400 m.) (12~16-VI-65, T. Maa & K. S. Lin). All the paratypes incomplete or in bad condition.

Distribution. Taiwan.

#### 7. *Diostracus mchughi* Harmston

*Diostracus mchughi* Harmston, Journal of Kansas Entomological Society 30: 224, 1966 [♂, Latourelle Fall, Oregon].

♂. Length, ca. 5 mm.; of the wings, ca. 6.5 mm. Face ca. × 1.5 as broad as the ocellar tubercle; clypeus metallic green, thinly brownish gray pollinose, gently convex below, ending well above the level of the lower edges of the eyes; epistome blackened, dusted with brownish gray pollen. Frons deep metallic blue-green, with brownish gray pollen. Palpi comparatively very small for a male and reposed on the proboscis, but attaining the anterior apical angle of the proboscis, which is comparatively less bulky for a member of the genus; a little less than twice as long as broad, brown, margined with black along the mesal side to the apex, in some lights silvery-glittering with bluish reflections; with black setae along the mesal margin to the apex, and with several yellow, delicate, hairy setae on the lateral margin. Proboscis less than 1/3 as high as the eyes. Occiput tinged with blue-green on the dark ground, covered with thick brownish gray pollen; black upper orbital cilia composed of 5-7 bristles, followed by pale yellow cilia below; beard abundant, pale yellow. Antennae black; 1st segment as long as deep; 3rd segment a little deeper than long, apically blunt.

Mesonotum metallic blue-green, laterally bronzy brown; with whitish gray pollen on the humeral calli to the notopleural depressions, and with brownish gray pollen between the humeral calli and on the prescutellar depression; 5 dorsocentral bristles; 1 sutural and 1 postsutural present; posterior notopleural slightly shorter than the anterior. Scutellum covered with thick brownish gray pollen, with 2 pairs of tiny setae, the inner pair situated between the scutellar bristles and the outer pair laterally to the scutellars. Pleura silvery gray owing to thick pollen, in some lights slightly tinged with green; prothoracic bristle pale yellow, rather hairy.

Wings elongate and rather narrow, rather of uniform breadth for their most length, hyaline and only slightly grayish, apically with a large, black maculation, which lies just in front of the 4th longitudinal vein, crossing the 2nd and 3rd veins; posterior cross-vein oblique, scarcely convex outwards, a little less than twice as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura, apically brown. Fore coxae swollen subapically on the anterior surface, the swollen part covered with a clump of many delicate, pale yellow hairs, which are curved apically. Middle coxae with many pale yellow hairs anteromesally. Trochanters brown. Fore trochanters with some short setae below. Femora black, dusted with thin whitish pollen, the apex brown. Fore femora eminently thickened below, 1/4 as deep as long at the basal 1/3, below with a row of elongate, erect bristles except towards the apex, the longest of these bristles are slightly shorter than half the depth of the femora. Middle femora thickened below subbasally, deepest at the basal 1/4, where they are 2/3 as deep as the fore femora, the thickened part with many long, pale yellow setae, which are ca. 1/4 as long as the segment. Hind femora plain, gently bent backwards about the basal 1/3. Tibiae black, with base brown. Fore tibiae somewhat thickened, with an anteroventral row of 6 or so long, suberect, bristly setae on a long middle part; some bristles on the dorsal side of the segment more or less strong; 1 posterior bristle basally to the middle of the segment. Middle tibiae depressed dorsoventrally, with 3 antero- and 2 posterodorsal bristles. Hind tibiae with 6 antero- and 3 posterodorsal bristles; with a posterodorsal row of shorter bristles on the apical 2/5; and with several rather outstanding setae below towards the base. Tarsi black. Fore basitarsus slightly shorter than the 2nd (18 : 20 : 16 : 8 : 6), somewhat thickened basally and apically, gently bowed below subbasally, with somewhat elongate setae on the anterior side, and also below towards the apex; similar elongate setae occurring below on the succeeding 2 segments; apical 2 segments with abundant soft and apically crinkly hairs on the posterior side. Middle basitarsus longer than the succeeding segments united (41 : 12 : 10 : 5 : 6). Hind basitarsus a little shorter than the succeeding 3 segments united (39 : 19 : 14 : 8 : 7), below on the whole length with some suberect bristles, which are longer than the depth of the segment.

Abdomen dark grayish brown, tinged with blue-green. Fourth sternite with a black area apicomediately, this area bearing a pair of small prominences. Hypopygium black, the ventral lobes brown. Outer lamellae comparatively well developed, dirty blackish brown, ciliated with many pale yellow hairs, which are crinkly apically.

♀. None specimen available.

Specimens examined. 1♂, Mt. Rainier, Washington (31-VII-66, F. C. Harmston coll.). Determined by Dr. Harmston.

Distribution. Northwestern U.S.A. (Washington; Oregon).

#### 8. *Diostracus miyagii*, n. sp.

♂. Length, ca. 4.5-5 mm.; of the wings, ca. 6-6.5 mm. Face twice, or a little less than twice, as broad as the ocellar tubercle, the epistome metallic green, with slight bronzy reflections; clypeus shining bronzy, thinly grayish brown pollinose, well convex below, the apex attaining the level of the lower edges of the eyes. Frons dark metallic blue-green, with grayish white pollen below the ocellar tubercle. Palpi extending beyond the anterior apical angle of the proboscis, × 2.4-3 as long as broad, black, in some lights silvery glittering with a strong bluish tinge; with setae evenly over the surface. Proboscis ca. 1/2, or less, as high as the eyes. Occiput thickly pollinose on the blue-green ground, the pollen being grayish brown behind the vertex, otherwise grayish white. Black upper orbital cilia descending ca. 1/2.5, or less, the eye-height; beard abundant, pale yellow. Antennae dark brown or practically black; 1st segment about

twice as long as deep, dorsally bare; 3rd segment as long as deep, apically blunt or roundish.

Mesonotum shining deep blue-green, laterally dark bronzy brown; with whitish pollen on the humeral calli and notopleural depressions, and with brownish pollen on the narrow posterior border; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; posterior notopleural practically as large as the anterior. Scutellum brown pollinose on the dark ground, in some lights with a slight green tinge, the margin with a pair of tiny setae laterally to the scutellar bristles. Pleura silvery gray owing to thick pollen; prothoracic bristle white, rather hairy.

Wings tinged with brown, with the posterior cross-vein a little oblique, slightly convex outwards or practically straight,  $\times 1.7\text{--}2.5$  as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura. Fore coxae on the anterior surface with many white hairs longer towards the base of the coxae. Fore trochanter brown. Middle and hind trochanters blackish. Femora blackened, thinly pollinose, in some lights tinged with green. Fore femora with delicate hairs below on the basal half, the longest of these hairs being about half as long as the depth of the segment (in some specimens much shorter). Middle femora with long, pale yellow, rather hairy setae below on about the basal half, most of these setae being much longer than the depth of the segment. Middle and hind femora with a strong anterior preapical bristle. Tibiae and tarsi blackened. Fore tibiae with 3 or 4 dorsal and 2 posterior bristles, and usually with several bristly setae below. Middle tibiae slightly depressed dorsoventrally, with 3 antero- and 2 posterodorsal bristles. Hind tibiae slightly curved up, with 5 antero- and 3 posterodorsal bristles, and also with some less strong bristles below. Fore basitarsus shorter than the 2nd and 3rd segments united (20 : 16 : 12 : 6 : 6). Middle basitarsus as long as the succeeding segments united (38 : 15 : 10 : 5 : 6). Hind basitarsus as long as the 2nd and 3rd segments united (37 : 21 : 14 : 7 : 6), with several bristles below.

Abdomen dark brownish, tinged with blue-green, and thinly grayish pollinose. Fourth sternite bent out below. Hypopygium black. Outer lamellae dark brown, with brown setae.

♀. Length, ca. 6 mm.; of the wings, ca. 7–8 mm. Face more than twice ( $\times 2.2\text{--}2.6$ ) as broad as the ocellar tubercle. Palpi more than twice as long as broad, not or scarcely attaining the anterior apical angle of the proboscis, coarsely dark grayish pollinose, with setae stronger than in ♂, several setae situated on the apex of the palpi are longer than the others. Wings with the posterior cross-vein about twice as long as the apical section of the 5th longitudinal vein. Fore femora a little slenderer than in ♂, without elongate setae below. Middle femora with white, quite delicate setae below on the basal half, the longest of these setae are shorter than the depth of the segment. Fore basitarsus as long as the 2nd and 3rd segments united (22 : 13 : 10 : 6 : 7).

Holotype (♂). Soranuma-dake, near Sapporo, Hokkaido (8-VIII-62, S. Takagi coll.) [HU].

Paratypes (24♂♂, 22♀♀). 1♀, Toikanbetu, Hokkaido (12-VIII-65, T. Kumata & K. Kusigemati); 1♀, Soranuma-dake (2-VII-61, Takagi); 4♂♂, 2♀♀, Soranuma-dake (8-VIII-62, T. Saigusa & Takagi); 3♂♂, 1♀, Soranuma-dake (6-VIII-63, Takagi); 1♂, 1♀, Soranuma-dake (12-VIII-63, Takagi); 2♂♂, 1♀, Soranuma-dake (27-VII-65, Kusigemati); 4♂♂, 1♀,

Soranuma-dake (2-VIII-67, Takagi); 6♂♂, 6♀♀, Hayatine-san, Iwate-ken, Honsyu (4-VIII-64, Takagi); 1♂, 2♀♀, Senzyô-dake, Yamanashi-ken, Honsyu (27-VII-61, 5-VII-, 14-VIII-63, Saigusa); 2♂♂, 3♀♀, Sirouma-dake, Nagano-ken, Honsyu (15~16-VIII-62, Saigusa); 1♂, Kamikôti, Nagano-ken (20-VIII-63, Saigusa); 1♀, Kiso-Koma, Nagano-ken (19-VII-63, Saigusa).

Distribution. Japan (Hokkaido; Honsyu).

9. *Diostracus nakanishii*, n. sp.

♂. Length, ca. 5.5 mm.; of the wings, ca. 6 mm. Face a little broader than the ocellar tubercle. Face and frons metallic green, but the ground colour is clouded with thick grayish pollen; clypeus well convex below, the apex almost attaining the level of the lower edges of the eyes. Palpi ca.  $\times 2.5$  as long as broad, attaining the anterior apical angle of the proboscis, rich yellow, in some lights golden-glittering, with some black setae scattered. Proboscis 1/2.5 as high as the eyes. Occiput thickly grayish pollinose on the dark ground; black upper orbital cilia descending half the eye-height; beard abundant, yellow. Antennae black; 1st segment a little more than twice as long as deep, subapically with a seta dorsally; 3rd segment as long as deep.

Mesonotum shining green, but in the single specimen at hand largely clouded with dark bronze; with white pollen on the anterior border through the humeral calli to the notopleural depressions, and with brownish gray pollen on the posterior angles; 5 dorso-central bristles; sutural and postsutural present; posterior notopleural as strong as the anterior. Scutellum brownish gray pollinose on the black ground, with a pair of tiny setae just laterally to the scutellar bristles. Pleura silvery gray owing to thick pollen; prothoracic bristle fine and brown.

Wings tinged with brown; posterior cross-vein ca.  $\times 1.5$  as long as the apical section of the 5th longitudinal vein.

Fore coxae brownish yellow, with short, delicate, brownish hairs on the anterior surface and with black, more or less stiff bristles apically. Middle and hind coxae concolorous with the pleura. Trochanters brownish yellow. Femora yellow. Fore femora with short, erect, black, bristly setae below except for the base and the apical 1/3. Middle femora with long black hairs and bristles below on the basal half, the longest of the bristles are longer than the depth of the femora. Tibiae yellow. Fore tibiae with 4 antero- and 2 posterodorsal and 4 posteroventral bristles. Middle tibiae with 3 antero- and 2 posterodorsal and 3 posteroventral bristles. Hind tibiae with 6 antero- and 3 posterodorsal bristles and with some short bristly setae below. Tarsi yellow, blackened on the apex of the 1st segment and on the succeeding segments. Fore tarsi with setae on the posterior surface somewhat elongate; basitarsus shorter than the 2nd and 3rd segments united (16 : 11 : 9 : 6 : 7), below slightly thickened basally and with short spine-like setae. Middle basitarsus as long as the succeeding segments united (32 : 12 : 9 : 5 : 7). Hind basitarsus nearly as long as the 2nd and 3rd segments united (26 : 16 : 12 : 7 : 7).

Abdomen black, with whitish pollen. Fifth tergite produced into an eminent ventral lobe on each side. Hypopygium black. Outer lamellae elongate, about as long as the height of the hypopygium, ribbon-like in shape, dirty yellowish brown, with a ciliation of brownish hairs.

♀. None specimen available.

Holotype (♂). Senzyō-dake, Nagano-ken, Honshu (21-VII-63, A. Nakanishi coll.) [KU].

Distribution. Japan (Honshu).

10. ***Diostracus olga*** Aldrich

*Diostracus olga* Aldrich, Psyche 18: 71, 1911 [♂♀, Olga, Washington].

♂. Length, ca. 4 mm.; of the wings, ca. 5.5 mm. Face  $\times 1.3$  as broad as the ocellar tubercle. Face and frons with brownish gray pollen on the shining dark blue-green ground; clypeus well convex below, the apex attaining the level of the lower edges of the eyes. Palpi  $\times 1.5$  as long as broad, brownish yellow, in some lights silvery glittering, with brownish setae. Proboscis 1/2.5 as high as the eyes. Occiput thickly grayish pollinose, with a little tinge of green; orbital cilia extending fairly below, with lower setae comprised in the rather short, yellow beard. Antennae black; 1st segment a little longer than deep, with setae dorsally; 3rd segment as long as or slightly shorter than deep.

Mesonotum shining dark green, laterally dark bronzy; with grayish pollen on the frontal area through the humeral calli to the notopleural depressions, and with brownish gray pollen on the posterior corners and the prescutellar depression; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; posterior notopleural smaller than the anterior, yet strong. Scutellum covered with brownish gray pollen on the dark ground, with a pair of slender setae laterally to the scutellar bristles, these setae are a little less than half as long as the scutellars. Pleura silvery gray owing to thick pollen; prothoracic bristle brown.

Wings tinged with brown, with the posterior cross-vein  $\times 1.3$  or so as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura, apically brownish yellow. Fore coxae with abundant, rather short, delicate, pale yellow hairs over the whole anterior surface. Trochanters brownish yellow. Femora plain, blackened and thinly whitish pollinose, with the base and apex brownish yellow. Tibiae black, with the extreme base brownish yellow. Fore tibiae with several antero- and posterodorsal bristles not strong. Middle tibiae with 3 antero- and 3 posterodorsal bristles. Hind tibiae with some antero- and posterodorsal bristles and with some more or less strong bristles below. Tarsi black. Fore basitarsus as long as the 2nd and 3rd segments united (18 : 10 : 9 : 5 : 5). Middle basitarsus as long as the succeeding segments united (31 : 12 : 9 : 5 : 6). Hind basitarsus as long as the 2nd and 3rd segments united (28 : 16 : 12 : 7 : 5).

Abdomen dark brown with green lustre, grayish pollinose. Hypopygium black. Outer lamellae short, black, with brownish setae.

♀. Length, ca. 4 mm. (the only specimen at hand somewhat shrunk in the abdomen); of the wings, ca. 6 mm. Face twice as broad as the ocellar tubercle. Palpi comparatively large for a female, covered with coarse brownish pollen, with black setae much stronger than in ♂. Proboscis ca. 1/2 as high as the eyes.

Specimens examined. 1♂, 1♀, Olympia, Washington (23-VII-60, F. C. Harmston coll.); 1♂, Mt. Hood, Oregon (29-VII-66, Harmston). All determined by Dr. Harmston.

Distribution. Northwestern U.S.A. (Washington; Oregon).

11. ***Diostracus prasinus*** Loew

*Diostracus prasinus* Loew, Neue Beiträge zur Kenntnis der Dipteren 8: 44, 1861, and Mono-

graphs of North American Diptera 2: 120, 1862 [♂♀, New York].

♂. Length, ca. 4 mm.; of the wings, ca. 5 mm. Face  $\times 1.5$  as broad as the ocellar tubercle, metallic blue-green, medially coppery, covered with thin grayish pollen, the transverse suture pronounced by a pair of black lateral swellings, but not distinct medially; clypeus short, slightly convex apically, ending much above the lower edges of the eyes. Frons metallic blue-green. Palpi a little longer than broad, rather rhombic in outline, glittering yellow, in some lights shining white, with small dark brown setae along the mesal margin. Proboscis bulky, produced about half the eye-height below the lower edges of the eyes, dark brown. Occiput convex, thickly grayish pollinose on the dark green ground; black upper orbital cilia descending  $1/4$  the eye-height; beard rather abundant, golden yellow. Vertex slightly concave. Vertical and postvertical bristles much smaller than the ocellars, yet rather stiff. Antennae about half as long as the head, brownish yellow, infuscated on the apical half of the 3rd segment; 1st segment a little longer than deep, a little longer than the 2nd, with several setae dorsally; 3rd segment as long as the basal two united, ca.  $\times 1.5$  as long as deep, hairy, in the lateral view conical with the apex blunt; arista subbasal, somewhat more than twice as long as the antennal segments united, short-plumose, dark brown or practically black.

Mesonotum metallic green, with purplish brown on the notopleural depressions, the anterior margin with whitish pollen, which is interrupted by the median stripes, the notopleural and prescutellar depressions with dense grayish pollen; 6 dorsocentral bristles; 1 humeral with a minute accompanying hair practically imperceptible; 1 posthumeral; posterior notopleural smaller than the anterior; sutural and postsutural bristles absent. Scutellum grayish pollinose on the dark brown ground, with a pair of fine setae laterally to the scutellar bristles. Pleura grayish pollinose on the dark green ground, prothoracic bristle with 1 or 2 much smaller hairs all pale yellow.

Wings tinged with brown, the veins brown; 1st longitudinal vein ending at the basal  $1/3$  of the wings, the 2nd and 3rd slightly divergent, the 4th slightly curved downwards in its apical section; posterior cross-vein somewhat beyond the middle of the wings, slightly convex outwards, slightly oblique, and a little shorter than the apical section of the 5th longitudinal vein. Calypters dirty brown, the cilia brown. Halteres brownish yellow.

Legs yellow, blackened towards the apex. Fore coxae with small, delicate, almost imperceptible, white hairs on the anterior surface, and with long, curved, blackish bristles on the anterior apical margin. Middle and hind coxae infuscated on the whole lateral surface. Femora plain. Fore femora somewhat thickened, nearly  $1/4$  as deep as long; hind femora with a distinct preapical bristle on the anterior side. Fore tibiae as long as the fore femora, slightly curved anteriorly and downwards towards the apex, thickened, the apical  $1/3$  shelving off on the lower margin and blackened; some stiff bristles on a broad middle area of the segment below, as long as or a little longer than the depth of the segment, and dark brown; eminent hairs on the apical half below, light brown, in some lights shining golden yellow, some hairs situated just anteriorly to the middle bristles are the longest, longer than the bristles, and bent towards the posteroapical direction of the segment; a distinct posterior preapical bristle below. Middle and hind tibiae slender, slightly curved up, blackened apically, with antero- and posterodorsal and posteroventral bristles small. Middle tibiae a little longer than the

middle femora; hind tibiae as long as the hind femora. Tarsi blackened except for the base of the middle tarsi yellow. Fore tarsi with the basal 3 segments strong; basitarsus somewhat longer than the 2nd (15 : 11 : 11 : 3 : 5); 2nd segment apically with a slight compression; 3rd segment as long as the 2nd, strongly compressed, 4/7 as deep as long, with black, strong bristles above on the whole length; 4th and 5th segments of usual form, the 4th shortened. Middle tarsi rather thickly covered with dark brown hairs on the posterior side; basitarsus as long as the succeeding 3 segments united (25 : 11 : 10 : 4 : 6), slightly curved downwards. Hind basitarsus longer than the 2nd segment, but shorter than the 2nd and 3rd united (29 : 20 : 16 : 6 : 7). Abdomen with the first 5 tergites entirely and the 6th partly visible, tinged with green, but little metallic. Fourth sternite bent out below. Hypopygium blackish, the 8th segment with tiny setae. Outer lamellae of the hypopygium small, elongate, gently broadened towards the apex, black in colour, with brownish setae.

♀. Length, ca. 4 mm.; of the wings, 5.3 mm. Face and frons blackened, the face ca. 1 2/3 as broad as the ocellar tubercle, the transverse suture distinct across the whole breadth of the face. Palpi much smaller than in ♂, oval, about twice as long as broad, dark brownish gray pollinose, with dark brown bristly setae over the whole surface. Antennae shorter than in ♂, the 3rd segment a little shorter than deep.

Wings broader and in colour a little duller than in ♂; posterior cross-vein as long as the apical section of the 5th longitudinal vein. Legs all plain and slender. Tibiae apically and tarsi, except for the base of 1st segment in the fore and middle legs, blackened. Fore coxae with the hairs on the anterior surface somewhat larger and the apical bristles weaker than in ♂. Middle and hind femora with a distinct preapical bristle on the anterior side. Middle and hind tibiae with distinct antero- and postero-dorsal bristles. Tarsi all plain. Fore basitarsus as long as the 2nd and 3rd segments united (17 : 9 : 8 : 4 : 5). Middle basitarsus nearly as long as the succeeding segments united (27 : 10 : 9 : 5 : 5). Hind tarsi with the segments approximately as in ♂ (27 : 16 : 14 : 5 : 6).

Specimens examined. 1♂, 1♀, Mt. Orford, Quebec, Canada (9-IX-37, G. E. Shewell coll.). Determined by Dr. Vockeroth.

Distribution. Eastern U.S.A. (Vermont; New York; Massachusetts; Pennsylvania; Virginia; North Carolina; Tennessee); eastern Canada (Quebec).

## 12. *Diostracus punctatus*, n. sp.

♂. Length, ca. 4.5–5.5 mm.; of the wings, 5.5–7.3 mm. Face a little less than twice as broad as the ocellar tubercle, metallic blue-green, with coppery reflections; clypeus well convex below, the apex produced beyond the level of the lower edges of the eyes. Frons deep bluish green, with a patch of whitish pollen below the ocellar tubercle. Palpi ca. × 3–3.5 as long as broad, brownish yellow, with the margin and the apical 1/3 black, in some lights silvery-glittering with a strong bluish tinge; with small black setae scattered over. Proboscis quite robust, ca. × 3/5 as high as the eyes. Occiput grayish pollinose on the dark ground, tinged with green. Black upper orbital cilia descending ca. 1/3 the eye-height; beard rather abundant, yellow. Antennae black; 1st segment more than twice to nearly × 3 as long as deep, normally without setae dorsally; 3rd segment distinctly longer than deep, apically rounded.

Mesonotum shining green (or bluish green), laterally dark bronzy, with white pollen

on the humeral calli and notopleural depressions and with brownish gray pollen on the posterior border; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; posterior notopleural a little shorter than the anterior. Scutellum brownish gray pollinose on the dark ground, with a pair of slender setae just laterally to the scutellar bristles, these setae are less than half as long as the scutellars. Pleura silvery owing to thick pollen; prothoracic bristle yellow.

Wings tinged with brown, scattered with dark brown spots, these spots are irregular in shape and number, but occur just beyond the middle of the wings and are always absent between the costa and the 2nd longitudinal vein and on a broad apical area; posterior cross-vein and often also the base of the apical section of the 4th longitudinal vein bordered with dark brown; posterior cross-vein gently convex outwards, a little more than twice as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura. Fore coxae with abundant, long, soft, white hairs on the anterior surface. Trochanters yellow. Femora plain, blackened, tinged with green, and thinly pollinose. Tibiae black. Fore tibiae with 4 dorsal (or anterodorsal), 2 posterior (or posterodorsal) and 4 posteroventral bristles. Middle tibiae with 3 antero- and 3 posterodorsal bristles, and with some bristles below. Hind tibiae with 5 antero- and 3 posterodorsal bristles and with rather numerous bristles below. Tarsi black. Fore basitarsus nearly as long as the succeeding 3 segments united (33 : 15 : 13 : 7 : 6). Middle basitarsus as long as the succeeding segments united (47 : 20 : 13 : 6 : 6). Hind basitarsus as long as the 2nd and 3rd segments united (43 : 28 : 16 : 8 : 6), with 3 or 4 bristles below. Abdomen dark brown with a slight green tinge and coppery reflections, and laterally with white pollen. Fourth sternite bent out below. Hypopygium black. Outer lamellae short and robust, black, with brown hairs.

♀. Length, ca. 6-7 mm.; of the wings, 7.3-7 mm. Face twice as broad as the ocellar tubercle. Face and frons more or less blackened. Palpi ca.  $\times 3$  as long as broad, covered with coarse dark grayish pollen, with short setae scattered, the apical margin with longer setae. Proboscis more robust than in ♂, ca. 4/5 as high as the eyes. Mesonotum tending to be dark bronzy. Wings without punctures. Legs practically as in ♂.

Holotype (♂). Soranuma-dake, near Sapporo, Hokkaido (8-VIII-62, S. Takagi coll.) [HU].

Paratypes (37♂♂, 34♀♀). 8♂♂, 8♀♀, same data with the holotype; 1♂, Soranuma-dake (8-VIII-62, T. Saigusa); 1♂, Soranuma-dake (29-VIII-65, K. Kusigemati); 1♂, Soranuma-dake (2-VIII-67, Takagi); 1♂, Muine-yama, near Sapporo (19-VIII-62, Takagi); 3♂♂, Toikanbetu, Hokkaido (12-VII-65, T. Kumata & Kusigemati); 2♂♂, 1♀, Daisetu-zan, Hokkaido (30-VII-67, Kusigemati); 2♂♂, Yukomanbetu, Daisetu-zan (14-VII-65, Kusigemati); 3♂♂, 2♀♀, Nukabira, Hokkaido (4~5-VIII-62, Saigusa); 1♀, Kamui-kotan, Hokkaido (8-VIII-64, Kusigemati); 12♂♂, 19♀♀, Hayatine-san, Iwate-ken, Honsyu (4-VIII-64, Takagi); 2♂♂, 2♀♀, Kanayama, Sudama, Yamanasi-ken, Honsyu (10~11-VIII-61, Saigusa); 1♂, 1♀, Wakasugi-yama, Hukuoka-ken, Kyusyu (23-VI-61, Saigusa).

Distribution. Japan (Hokkaido; Honsyu; Kyusyu).

### 13. *Diostracus saigusai*, n. sp.

♂. Length, 5 mm.; of the wings, 7 mm. Face  $\times 1.4$  as broad as the ocellar tubercle, metallic green, with thin brownish gray pollen; clypeus well convex below, the apex

attaining the level of the lower edges of the eyes. Frons velvety black, with a small patch of white pollen below the ocellar tubercle. Palpi  $\times 2.2$  as long as broad, velvety black, in some lights silvery glittering with a bluish tinge; with small setae on the whole surface. Occiput with brownish gray pollen above and whitish pollen below on the green ground; black upper orbital cilia descending  $1/3$  the eye-height; beard abundant, long and yellow. Proboscis  $1/2.7$  as high as the eyes. Antennae black; 1st segment about twice as long as deep, with setae dorsally; 3rd segment as long as deep, apically obtuse; arista subapical.

Mesonotum shining green, but largely clouded with dark bronze, with thin silvery pollen on the humeral calli and notopleural depressions, and with grayish brown pollen on the posterior border; 6 dorsocentral bristles; sutural and postsutural bristles absent; posterior notopleural a little smaller than the anterior. Scutellum with grayish pollen on the dark green ground; supplementary marginal setae absent. Pleura silvery owing to thick pollen; prothoracic bristle fairly elongate, with some long, fine hairs, all being yellow.

Wings grayish hyaline, with a jet black nodule just outside of the posterior cross-vein, which is curved inwards around the inner side of the nodule, oblique, and twice as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura. Fore coxae on the anterior surface with many long, fine, pale yellow hairs towards the base, and with a clump of many rigid, black, erect bristles towards the apex. Femora blackened with coppery reflections, thinly pollinose. Fore femora a little thickened, slightly bent up at about the basal  $1/3$ , with 1 or 2 basal posterior bristles gently curved towards the apex of the femora, and below with an irregular row of black setae except for a long apical length of the femora; these setae are more or less hairy and the longest of them are about half as long as the depth of the femora. Middle femora with 3 long, yellow hairs subbasally below, these hairs being nearly  $1/3$  as long as the femora\*. Hind femora plain. Tibiae black. Fore tibiae somewhat thickened, with 3 dorsal (or anterodorsal) and 2 posterior (or posteroventral) bristles, and with 3 long posteroventrals beyond the middle, these posteroventral bristles are  $1/4$  as long as the fore tibiae and slanting towards the apex of the fore tibiae. Middle tibiae slightly depressed dorsoventrally, with 3 antero- and 2 postero-dorsal bristles all rather small. Hind tibiae with 4 antero- and 4 posteroventral bristles, and below with some bristles less outstanding. Tarsi black. Fore basitarsus somewhat shorter than the succeeding 2 segments united (22 : 17 : 10 : 7 : 8), with a comb of short, erect, compressed bristles below, and with a row of rather elongate setae posteroventrally; 2nd segment with a posteroventral row of setae similar to that of the 1st segment. Middle basitarsus as long as the succeeding segments united (36 : 12 : 9 : 5 : 9). Hind basitarsus as long as the 2nd and 3rd segments united (37 : 22 : 14 : 8 : 10), with several bristles below.

Abdomen dark brown, laterally metallic green with white pollen. Basal 4 tergites with long, delicate, yellow hairs laterally; 4th sternite bent out below. Hypopygium black. Outer lamellae black, elongate, as long as the height of the hypopygium, slightly sinuate, and ciliated with long, yellow hairs.

♀. Length, 6 mm.; of the wings, 8 mm. Face twice as broad as the ocellar tuber-

\* In the single specimen at hand the middle femora are somewhat deformed on drying, so that their exact shape is unknown.

cle, blackened, with a strong green tinge on the clypeus. Palpi  $\times 2.5$  as long as broad, dark grayish brown. Proboscis not much more bulky than in ♂. Mesonotum wholly dark bronzy in the single specimen at hand. Wings plain, with the posterior cross-vein slightly sinuate. Fore coxae with rather short, delicate, whitish hairs on the whole anterior surface. Femora all plain, the middle femora only slightly depressed dorsoventrally towards the apex. Tibiae similar to those of ♂ in their bristles, but the fore tibiae with the 2 posteroventral bristles beyond the middle not so much elongate as in ♂. Fore basitarsus plain and a little shorter than the 2nd and 3rd segments united (22 : 14 : 10 : 6 : 8). Middle tarsi with the segments as in ♂ (34 : 14 : 10 : 5 : 8). Hind basitarsus a little shorter than the 2nd and 3rd segments united (35 : 24 : 16 : 9 : 10).

Holotype (♂) and paratype (1♀). A-li Shan, Taiwan (8-IV-65, T. Saigusa coll.) [SM].

Distribution. Taiwan.

14. *Diostracus tarsalis*, n. sp.

♂. Length, ca. 5.5–6 mm.; of the wings, ca. 6.5–7 mm. Face about twice as broad as the ocellar tubercle; clypeus metallic green, with thin brownish gray pollen, the apex well convex, attaining the level of the lower edges of the eyes; epistome and frons less shining, more or less darker, and often tinged with blue or purple, the frons with a patch of whitish pollen just below the ocellar tubercle. Palpi ca.  $\times 3$  as long as broad, velvety black, in some lights silvery glittering with blue, with small black setae over the whole surface. Proboscis ca. 1/1.5 as high as the eyes at maximum. Occiput grayish pollinose on the dark green ground; black upper orbital cilia descending ca. 1/3 the eye-height; beard rather abundant, yellow. Antennae black; 1st segment twice as long as deep, without setae dorsally; 3rd segment a little shorter than deep.

Mesonotum shining deep green, laterally bronzy black, with white pollen on the frontal area to the notopleural depressions and with brownish gray pollen on the posterior border; 6 dorsocentral bristles; 1 sutural and 1 postsutural present; posterior notopleural as strong as the anterior. Scutellum blackened, tinged with green, covered with brownish gray pollen, with 2 pairs of small marginal setae, the inner pair situated between the scutellar bristles and the outer pair laterally to the scutellars. Pleura grayish owing to thick pollen; prothoracic bristle yellow.

Wings tinged with brown; posterior cross-vein oblique, slightly convex outwards, ca.  $\times 1.5$  as long as the apical section of the 5th longitudinal vein.

Coxae concolorous with the pleura, brownish at the extreme apex. Fore coxae with white, soft hairs on the anterior surface, these hairs are longer towards the base of the coxae. Fore trochanters brown. Middle and hind trochanters blackened. Femora black, tinged with blue-green, and covered with thin whitish pollen, the extreme apex dark brown. Fore femora with short, erect, weak setae below. Middle femora with many suberect setae below, the longest of these setae are longer than the depth of the femora. Hind femora with setae below more or less elongate except towards the base of the femora. Tibiae black, with a bluish tinge. Fore tibiae somewhat thickened, with 3 or 4 dorsal, 3 posterior and 4 or 5 posteroventral bristles. Middle tibiae with 3–5 antero- and 3 or 4 posterodorsals, and also with 2 or 3 posteroventrals. Hind tibiae with 5 or 6 antero- and 4 or 5 posterodorsals, and also with 2–4 bristles below beyond the middle. Tarsi black. Fore basitarsus somewhat thickened, as long

as the 2nd segment (17 : 17 : 18 : 9 : 6), with the apex eminently expanded dorsoventrally, and with somewhat elongate setae below towards the base; 2nd segment with posterior setae elongate; 3rd with posterior setae less elongate. Middle basitarsus slightly longer than the succeeding segments united (42 : 15 : 11 : 6 : 7). Hind basitarsus as long as the 2nd and 3rd segments united (38 : 22 : 15 : 9 : 8), with several bristles below.

Abdomen dark brown medially, but largely shining green laterally, with thin white pollen. Third and 4th sternites with long, yellow hairs. Hypopygium black, with the ventral lobes brown. Outer lamellae well developed, black, and ciliated with long, yellow hairs.

♀. Length, ca. 6–7 mm.; of the wings, ca. 7 mm. Face ca.  $\times 2.3$  as broad as the ocellar tubercle. Face and frons blackened. Palpi with dark brownish gray pollen, and with setae somewhat stronger than in ♂. Proboscis somewhat more bulky than in ♂. Wings darker than in ♂; posterior cross-vein little or slightly convex outwards, more than twice as long as the apical section of the 5th longitudinal vein. Fore coxae with white hairs on the anterior surface all short. Femora all plain. Tibiae with bristles approximately as in ♂. Fore basitarsus as long as the 2nd and 3rd segments united (24 : 14 : 11 : 7 : 7), slender. Middle basitarsus as long as the succeeding segments united (40 : 15 : 10 : 6 : 7). Hind tarsi as in ♂. Sternites of the abdomen with delicate white hairs.

Holotype (♂). Soranuma-dake, near Sapporo, Hokkaido (12–VII–63, S. Takagi coll.) [HU].

Paratypes (8♂♂, 9♀♀). 4♂♂, 6♀♀, same data with the holotype; 1♂, Toikanbetu, Hokkaido (12–VIII–65, T. Kumata & K. Kusigemati); 3♂♂, 3♀♀, Syokanbetu-dake, Hokkaido (21–22–VII–64, I. Miyagi).

Distribution. Japan (Hokkaido).

# 15. *Diostracus undulatus*, n. sp.

♂. Length, ca. 5–5.5 mm.; of the wings, ca. 6–7 mm. Face ca. 4/3 as broad as the ocellar tubercle; clypeus metallic green, with grayish brown pollen, the free margin well convex below, the apex attaining the level of the lower edges of the eyes; epistome and frons metallic deep green, often with a strong bluish or purplish tinge, the frons with whitish gray pollen below the ocellar tubercle. Palpi  $\times 1.7$ –2 as long as broad, velvety dark brown, in some lights silvery glittering with a strong bluish tinge; with quite tiny setae on the whole surface. Proboscis 1/3 as high as the eyes. Occiput shining green, with grayish pollen; black orbital cilia descending fairly below, the beard rather abundant, long, and yellow. Antennae black; 1st segment a little less than twice as long as deep, dorsally bare; 3rd segment slightly shorter than deep.

Mesonotum shining green, laterally dark bronzy; with grayish pollen on the humeral calli, and with brownish gray pollen on the posterior border; 5 dorsocentral bristles; no sutural; 1 postsutural present; notopleurals smaller than the dorsocentrals, the posterior notopleural smaller than the anterior. Scutellum dark green, with brownish gray pollen; with some tiny setae on the margin mostly laterally to the scutellar bristles. Pleura dark green, covered with silvery pollen. Prothoracic bristle well developed, black.

Wings grayish hyaline, the posterior margin broadly excavated about the middle and shallowly so subapically; posterior cross-vein quite oblique, practically straight;

apical section of the 5th longitudinal vein short.

Coxae concolorous with the pleura, with the apex brownish. Fore coxae with 1-3 black, curved bristles basally on the anterior surface, and with some small, delicate setae around the basal bristles. Trochanters brown. Femora blackened, tinged with green, with the base and apex brown. Fore femora with a row of short, erect setae below except towards the apex of the femora. Middle femora a little depressed dorsoventrally towards the apex, with a row of 2 or 3 bristles below basally to the middle, these bristles are oblique towards the apex of the femora, the basalmost of them is the longest, being a little longer than the depth of the femora. Hind femora with a row of slender, hairy, yellow setae below on a long middle area, the longest setae surpassing the depth of the femora. Tibiae black, with the base brown. Fore tibiae with 4 dorsal (or anterodorsal) and 2 posterior bristles all well developed, and with an anteroventral row of long, hairy setae except towards the apex of the tibiae, these anteroventral setae are longest on the base of the tibiae, being there ca.  $\times 3$  as long as the depth of the tibiae and decreasing in length towards the apex of the tibiae. Middle tibiae somewhat depressed dorsoventrally, with 3 antero- and 2 posterodorsal bristles all well developed, and with 5 or 6 strong bristles below beyond the middle all oblique towards the apex of the tibiae, the basalmost two of these ventral bristles are straight and quite elongate, being ca. 1/4 as long as the tibiae. Hind tibiae slightly curved up towards the apex, with 4 or 5 antero- and 3-5 posterodorsal bristles, and with 5 or so bristles below towards the apex, the longest of these bristles are more than twice as long as the depth of the tibiae. Tarsi black. Fore basitarsus as long as the succeeding 3 segments united (28 : 12 : 9 : 6 : 7), a little thickened, with a row of quite short, strong, erect, apically blunt bristles below on the basal half, and with abundant long hairs on the posterior side, the anterior setae also somewhat elongate but little hairy; 2nd and 3rd segments with hairs on the posterior side, these hairs are much shorter than those of the basitarsus. Middle basitarsus a little longer than the succeeding segments united (40 : 12 : 10 : 6 : 8), gently sinuate in the lateral view, with 1-3 elongate posterior bristles beyond the middle. Hind basitarsus somewhat longer than the succeeding 2 segments united (40 : 20 : 14 : 9 : 8), with some strong bristles below, these bristles are mostly ca. 1/4 as long as the basitarsus.

Abdomen dark brown, laterally shining green with white pollen. Hypopygium black. Outer lamellae short, blackish, ciliated with brown setae.

♀. Length, ca. 5 mm.; of the wings, ca. 6.5 mm. Face a little less than twice as broad as the ocellar tubercle. Face and frons dark green, with bluish or purplish reflections. Palpi with coarse grayish pollen, and with setae stronger than in ♂, some apical setae are longer. Proboscis slightly more bulky than in ♂. Wings normal in shape, with the posterior cross-vein fairly oblique, straight, and ca.  $\times 1.5$  as long as the apical section of the 5th longitudinal vein.

Fore coxae approximately as in ♂. Femora all without outstanding setae. Fore tibiae with 4 dorsal (or anterodorsal) and 2 posterior bristles well developed, otherwise without outstanding setae. Middle tibiae with 3 antero- and 2 posterodorsal bristles, and with some bristles below irregular in length. Hind tibiae with 4 antero- and 3 posterodorsal bristles, otherwise without particularly outstanding setae. Fore tarsi without particular setae, the basitarsus slightly longer than the succeeding 3 segments united (23 : 10 : 7 : 4 : 7). Middle basitarsus straight, as long as the succeeding segments

united (35 : 12 : 9 : 6 : 7), without particularly elongate setae. Hind basitarsus somewhat longer than the succeeding 2 segments united (35 : 19 : 14 : 8 : 7), with some bristles below shorter than in ♂.

Holotype (♂). Fen-chi-hu, Taiwan (12-IV-65, T. Saigusa coll.) [SM].

Paratypes (4♂♂, 7♀♀). Fen-chi-hu (12-IV-65, Saigusa and S. Takagi).

Distribution. Taiwan.

16. *Diostracus yukawai*, n. sp.

♂. Length, ca. 4.5–5 mm.; of the wings, 5–5.3 mm. Face ca.  $\times 1.5$  as broad as the ocellar tubercle; clypeus metallic green, with strong coppery reflections, well convex below, the apex attaining the level of the lower edges of the eyes; epistome metallic deep green. Frons blackened, with a green tinge. Palpi 4/3 as long as broad, yellow, in some lights glittering with a slight bluish tinge; with small brown setae sparsely and irregularly scattered. Proboscis about half as high as the eyes. Occiput blackened, strongly tinged with green, thinly grayish pollinose; black orbital cilia extending to the lower margin of the occiput, with lower setae longer and rather hairy; beard thin, black. Antennae brown; 1st segment twice as long as deep, dorsally bare; 3rd segment  $\times 1.4$  as long as deep; arista black, terminating in a small, compressed, fusiform lamella.

Mesonotum shining green, with coppery reflections, laterally dark bronzy; with grayish pollen on the humeral calli and notopleural depressions, and with grayish brown pollen on the prescutellar depression; 6 dorsocentral bristles; 1 sutural and 1 postsutural present and comparatively well developed; posterior notopleural a little shorter than the anterior. Scutellum shining dark green, with a pair of fine setae laterally to the scutellar bristles. Pleura silvery gray with a slight green tinge; prothoracic bristle black.

Wings tinged with brown; posterior cross-vein slightly sinuate, ca.  $\times 1.5\text{--}2$  as long as the apical section of the 5th longitudinal vein; apical section of the 4th vein gently convex forwards.

Coxae concolorous with the pleura, with the apex yellow. Fore coxae with black hairs towards the base on the anterior surface. Trochanters yellow. Femora black with a green tinge, with the base and apex yellow. Fore femora black on the middle 1/3, with a small clump of short brown hairs basally on the posteroventral side. Middle femora strongly depressed dorsally on a broad middle part. Hind femora gently curved down in the lateral view. Fore and middle tibiae yellow, brownish towards the apex. Fore tibiae slightly shelving off below towards the apex, with 2 or so pairs of antero- and posterodorsal bristles. Middle tibiae with 3 antero- and 2 posterodorsal bristles, and with several small bristles below. Hind tibiae gently sinuate in both lateral and dorsoventral views, blackened with the base yellowish; with 4 antero- and 1 subbasal posterodorsal bristles, and with abundant, stiff, brown or blackish hairs on the posterior side of the apical half, these hairs are somewhat oblique towards the apex of the tibiae, about 1/6 as long as the tibiae at the middle of the tibiae, and gradually shorter towards the apex of the tibiae. Fore tarsi blackened, with the extreme base yellowish; basitarsus as long as the succeeding 3 segments united (20 : 10 : 7 : 3 : 4), slightly thickened towards the base, with long, stiff, blackish hairs on the posterior side, these hairs are oblique towards the apex of the segment and mostly ca. 1/4 as long as the segment; succeeding segments also with posterior setae somewhat elongate but not so much as on the basi-

tarsus. Middle basitarsus as long as the succeeding segments united (28 : 11 : 8 : 5 : 5), yellow, blackened beyond the middle, gently curved down, thickened on the middle 1/3, then becoming slender towards the apex; with a clump of eminent, black, compressed setae on the middle 1/3 either dorsally and ventrally; 2nd and succeeding segments black. Hind tarsi black, the basitarsus as long as the 2nd and 3rd segments united (26 : 17 : 11 : 7 : 6).

Abdomen deep blue-green, with the dorsum blackish; in some lights grayish owing to thin pollen. Fourth sternite bent out below. Hypopygium black, with the ventral lobes and a large part just above the ventral lobe polished and brown. Outer lamellae small, brown.

♀. Length, ca. 5 mm.; of the wings, ca. 5.5–6 mm. Face a little less than twice as broad as the ocellar tubercle, blackened with a green tinge. Palpi not attaining the anterior apical angle of the proboscis,  $\times 1.8$  as long as broad, dark brown, with black setae, of which several apical ones are elongate and bristly. Third antennal segment slightly longer than deep; arista without a lamella apically. Fore coxae with black hairs on the whole anterior surface. Fore femora plain. Middle femora only slightly depressed above about the middle. Hind femora curved down as in ♂. Tibiae dark brown or blackish, yellow towards the base, otherwise approximately as in ♂, but the hind tibiae lacking posterior hairs. Tarsi blackened, yellow at the extreme base, all plain, the segments approximately as in ♂ in relative length (23 : 11 : 8 : 5 : 5 in the fore tarsi; 33 : 13 : 9 : 6 : 6 in the middle tarsi; 33 : 18 : 13 : 7 : 7 in the hind tarsi).

Holotype (♂). Sekisuizi, Kôhu, Yamanasi-ken, Honsyu (31-V-60, T. Saigusa coll.) [KU].

Paratypes (8♂♂, 6♀♀). 1♂, Kanayama, Sudama, Yamanasi-ken (30-VI-63, Saigusa); 1♂, 1♀, Amarizawa, Nirazaki, Yamanasi-ken (7-VI-60, Saigusa); 1♀, same data with the holotype; 6♂♂, 4♀♀, Sumata-kyô, Sizuoka-ken, Honsyu (5-VI-68, J. Yukawa coll.).

Distribution. Japan (Honsyu).

#### Relationship of the species

The specific characters are clearly distinct in all the cases, but many are sexual. It is very easy to distinguish the species on the basis of male characters. On the other hand, these characters are mostly so diverse and specific that they are not always useful for grouping species.

*Prasinus*, the type-species from North America, is rather unique. This species lacks both sutural and postsutural bristles. *Saigusai*, from Taiwan, is the only other species in which both these bristles are absent. It is evident, however, that the two are not particularly related at all, because in other respects they are quite different.

*Olga*, another North American species, appears rather close to *flavipes* and *genualis*, both from Japan, and *kinotoi*, from Taiwan. All these species agree in the body smaller in size, the legs plain or nearly so in the males, and the mesonotal chaetotaxy complete; the females are fairly similar and separated by the colour of the legs or other minor details.

The combination of *antennalis* and *yukarawai* is almost the only case in which I can point out to a certainty a close relationship. Certain peculiar male characters are common to both; and it is difficult to distinguish the females. The male genital

characters are, however, quite distinct between them, proving that these species are well differentiated. Both occur in Japan, *antennalis* being collected in Kyusyu, whereas *yukawai* in central Honsyu.

The five Japanese species *fasciatus*, *inornatus*, *miyagii*, *punctatus* and *tarsalis* may be more or less closely related. These species are larger in the size of the body, and have a complete set of the mesonotal chaetotaxy. The females are all similar and can be separated through careful examinations. The males are, however, diverse in various characters. All these species occur in Hokkaido, and two of them are known also from southern localities of Japan.

The North American *mchughi*, the Japanese *nakanishii* and the Taiwanese *undulatus* are identical in having five pairs of dorsocentral bristles, but it is open to doubt that they belong to a close phylogenetic stock, because the male characters are too diverse and peculiar. *Undulatus* even lacks the sutural bristles. It seems that these species, together with *prasinus* and *saigusai*, are all isolated.

After all, the informations at hand are too insufficient and fragmentary to bring a satisfactory conclusion on the specific relationship within the genus. It should also be added here that further studies on the genus may offer some suggestions as to the origins of the peculiar montane Hydrophorine genera inhabiting the Alps and the Caucasus.

### Explanation of plates

**Plate III.** Fig. 1. Soranuma-dake, Hokkaido. A mountain stream in a dark gorge. Habitat of *Diostracus fasciatus*, *D. miyagii* and *D. punctatus*. Fig. 2. A lower, wider course of the stream. Habitat of *D. tarsalis*, together with a *Liancalus*-species and some Clinocerine-Empidids.

**Plate IV.** Figs. 3-10. Outline of the body, ♂. Fig. 3: *antennalis*; 4: *fasciatus*; 5: *kimotoi*; 6: *miyagii*; 7: *punctatus*; 8: *tarsalis*; 9: *saigusai*; 10: *undulatus*.

**Plate V.** Figs. 11-22. Head in profile. Fig. 11: *antennalis*, ♂; 12: *antennalis*, ♀; 13: *fasciatus*, ♂; 14: *fasciatus*, ♀; 15: *kimotoi*, ♂; 16: *mchughi*, ♂; 17: *miyagii*, ♂; 18: *miyagii*, ♀; 19: *punctatus*, ♂; 20: *punctatus*, ♀; 21: *tarsalis*, ♂; 22: *tarsalis*, ♀.

**Plates VI & VII.** Figs. 23-38. Wing, ♂. Fig. 23: *antennalis*; 24: *fasciatus*; 25: *flavipes*; 26: *genualis*; 27: *inornatus*; 28: *kimotoi*; 29: *mchughi*; 30: *miyagii*; 31: *nakanishii*; 32: *olga*; 33: *prasinus*; 34: *punctatus*; 35: *saigusai*; 36: *tarsalis*; 37: *yukawai*; 38: *undulatus*.

**Plates VIII & IX.** Figs. 39-52. Wing, ♀. Fig. 39: *antennalis*; 40: *flavipes*; 41: *genualis*; 42: *kimotoi*; 43: *fasciatus*; 44: *inornatus*; 45: *miyagii*; 46: *olga*; 47: *prasinus*; 48: *yukawai*; 49: *undulatus*; 50: *punctatus*; 51: *saigusai*; 52: *tarsalis*.

**Plates X & XI.** Figs. 53-68. Abdomen, ♂. Fig. 53: *antennalis*; 54: *fasciatus*; 55: *flavipes*; 56: *genualis*; 57: *inornatus*; 58: *kimotoi*; 59: *mchughi*; 60: *miyagii*; 61: *nakanishii*; 62: *olga*; 63: *prasinus*; 64: *punctatus*; 65: *saigusai*; 66: *tarsalis*; 67: *yukawai*; 68: *undulatus*.

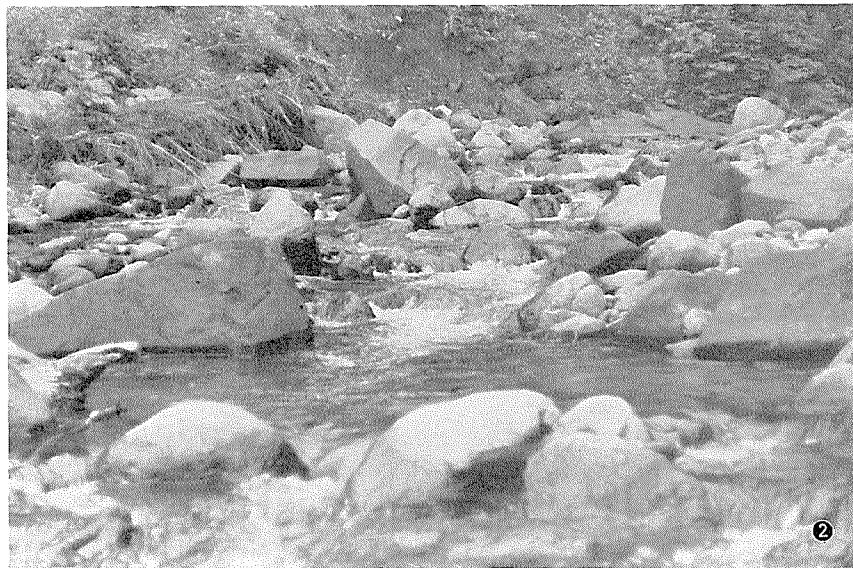
**Plates XII-XV.** Figs. 69-84. Abdominal sternites, ♂ (III, IV, V: 3rd, 4th and 5th sternite). Fig. 69: *antennalis*; 70: *fasciatus*; 71: *flavipes*; 72: *genualis*; 73: *inornatus*; 74: *kimotoi*; 75: *mchughi*; 76: *miyagii*; 77: *nakanishii*; 78: *olga*; 79: *prasinus*; 80: *punctatus*; 81: *saigusai*; 82: *tarsalis*; 83: *yukawai*; 84: *undulatus*.

**Plates XVI-XVIII.** Figs. 85-104. Hypopygial organs (L: outer lamella; V: ventral lobe; I: intromittent organ; S: sheath of the intromittent organ; P: inner process of the

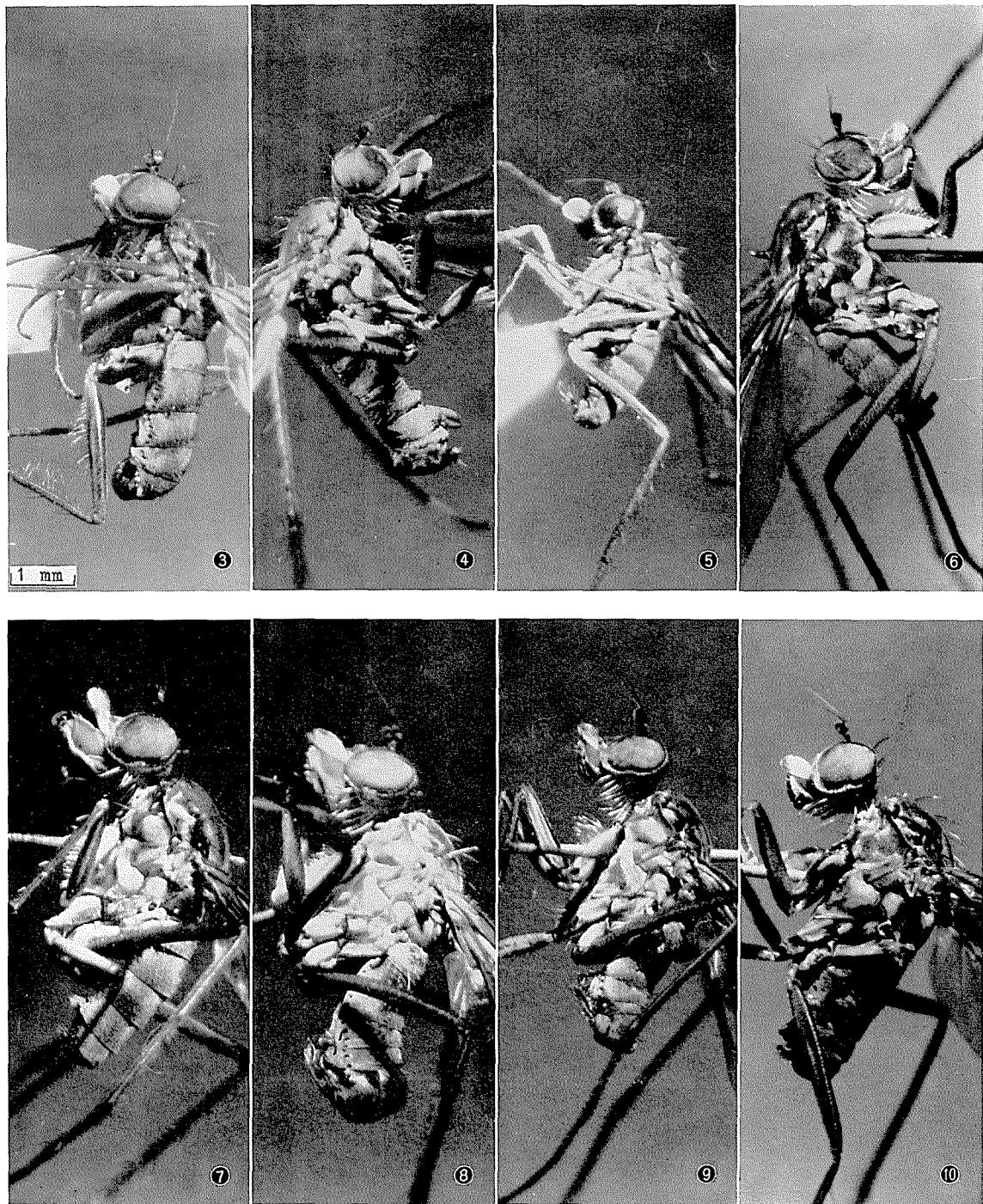
hypopygial capsel). Figs. 86, 90, 91 and 98 more enlarged all on the same scale; ←: anterior direction. Figs. 85 & 86: *antennalis*; 87: *flavipes*; 88 & 91: *genualis*; 89 & 90: *fasciatus*; 92: *inornatus*; 93: *kimotoi*; 94: *mchughi*; 95: *miyagii*; 96: *nakanishii*; 97 & 98: *olga*; 99: *prasinus*; 100: *punctatus*; 101: *saigusai*; 102: *tarsalis*; 103: *yukawai*; 104: *undulatus*.

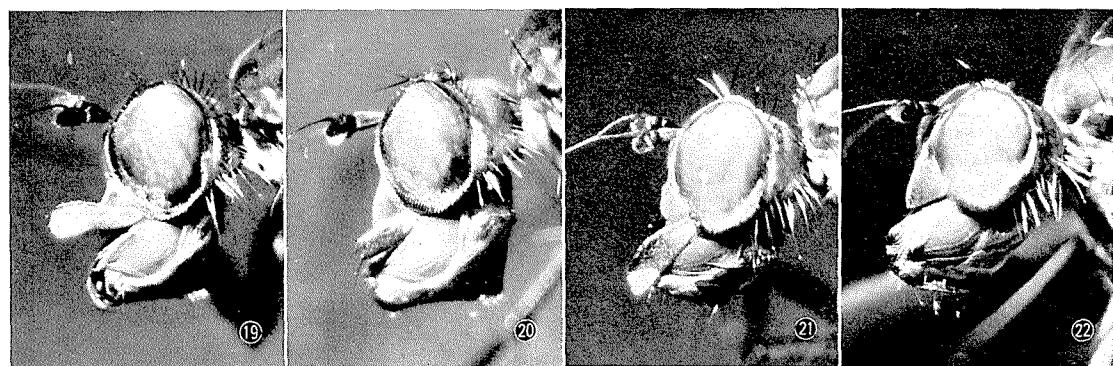
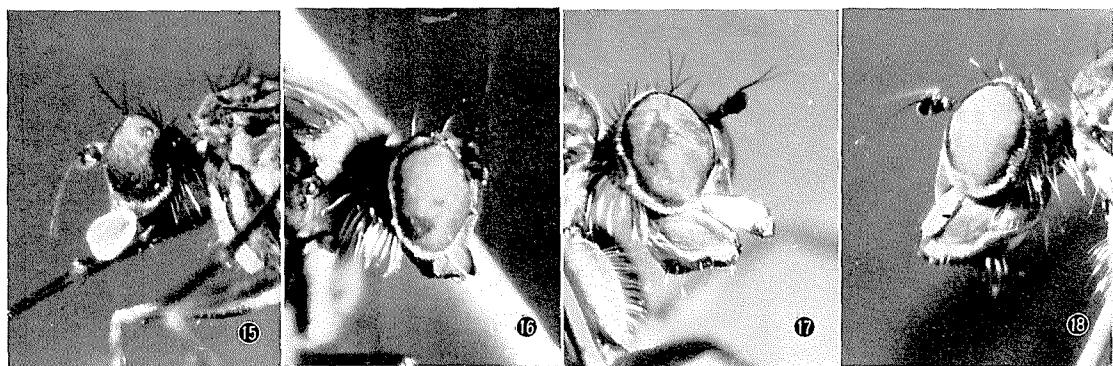
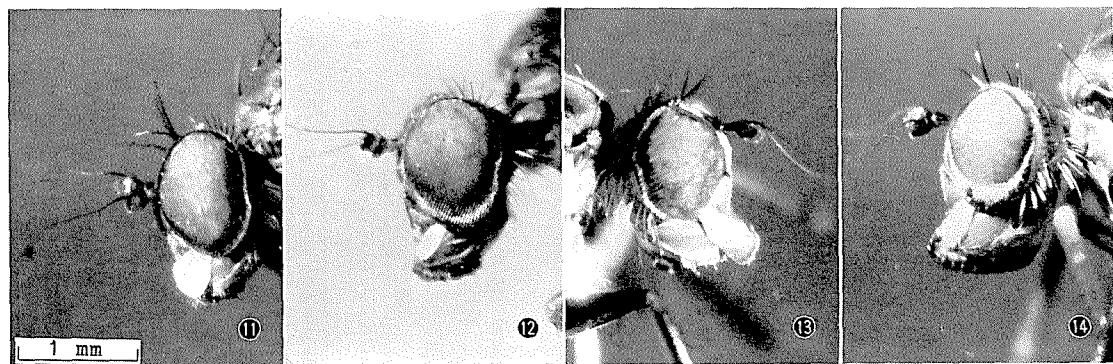


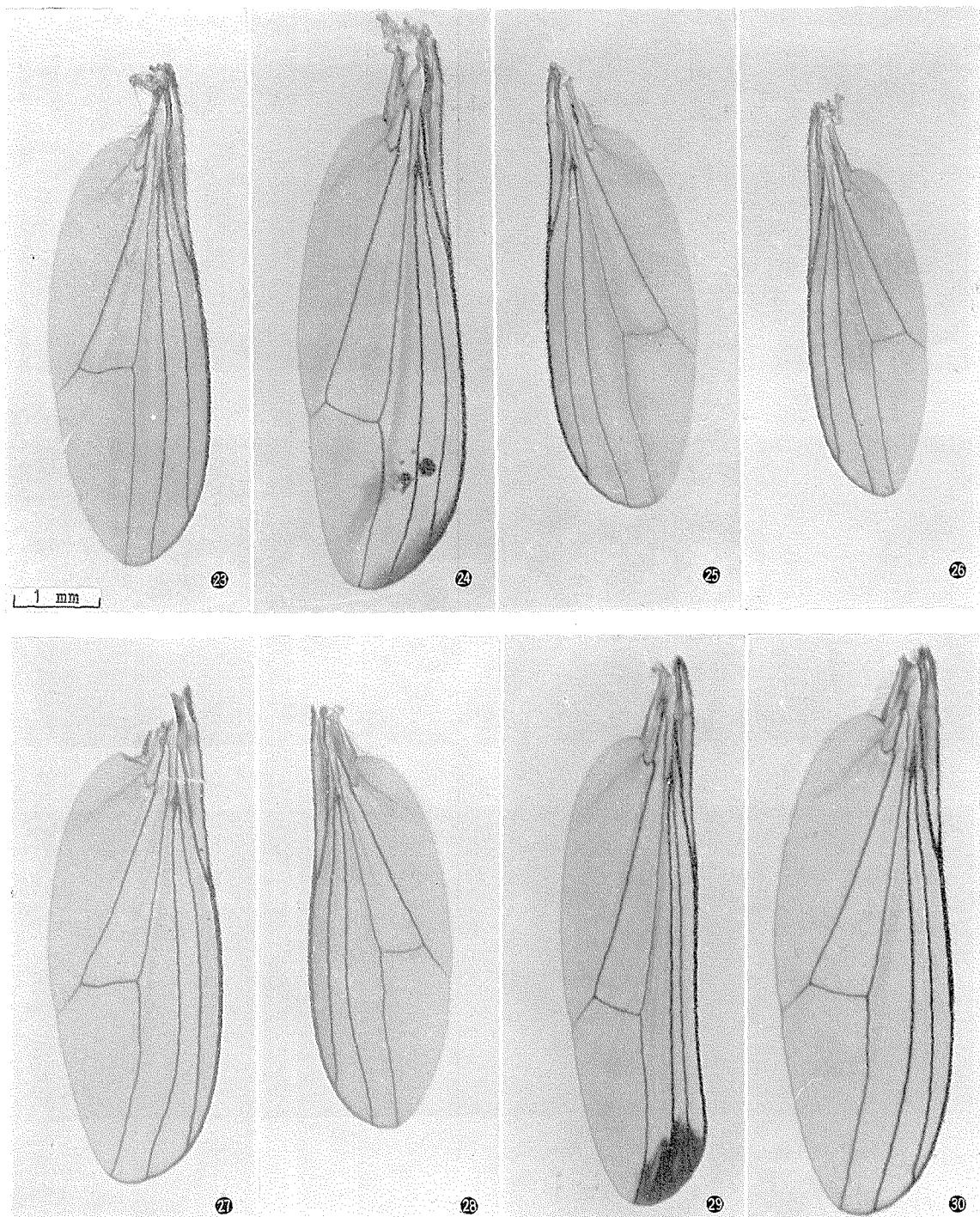
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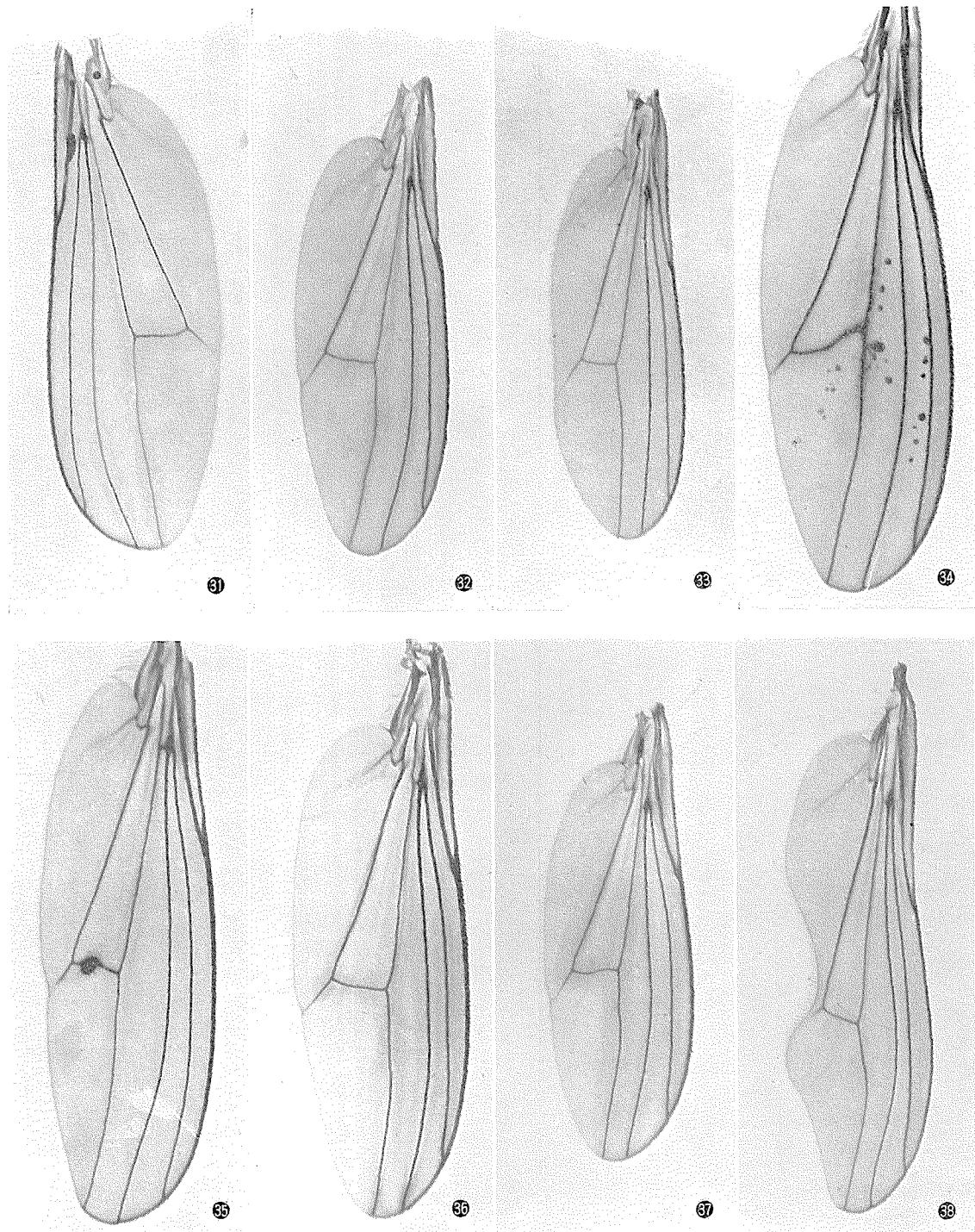


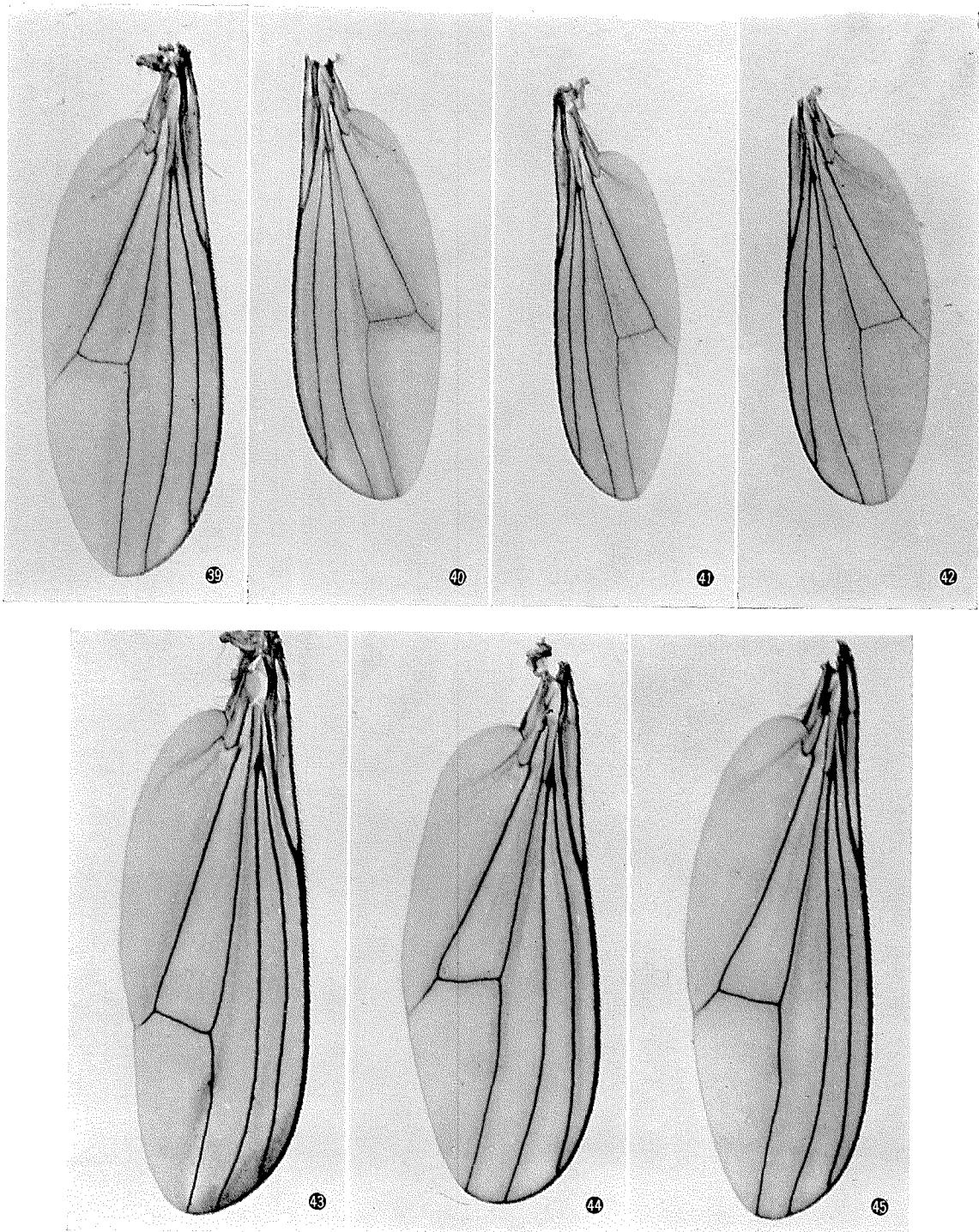
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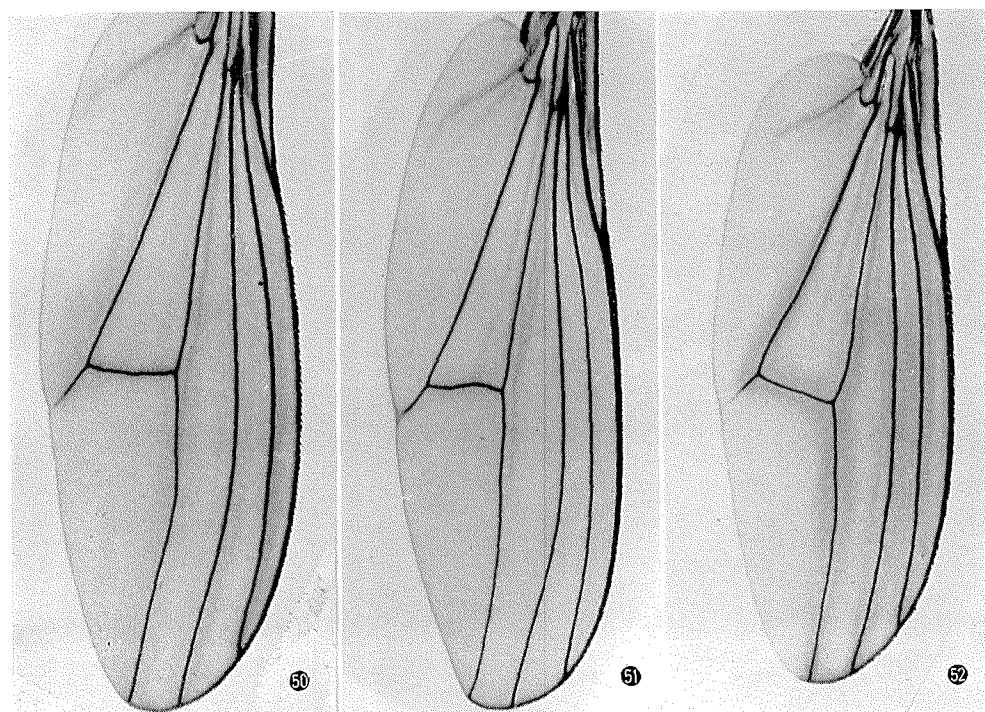
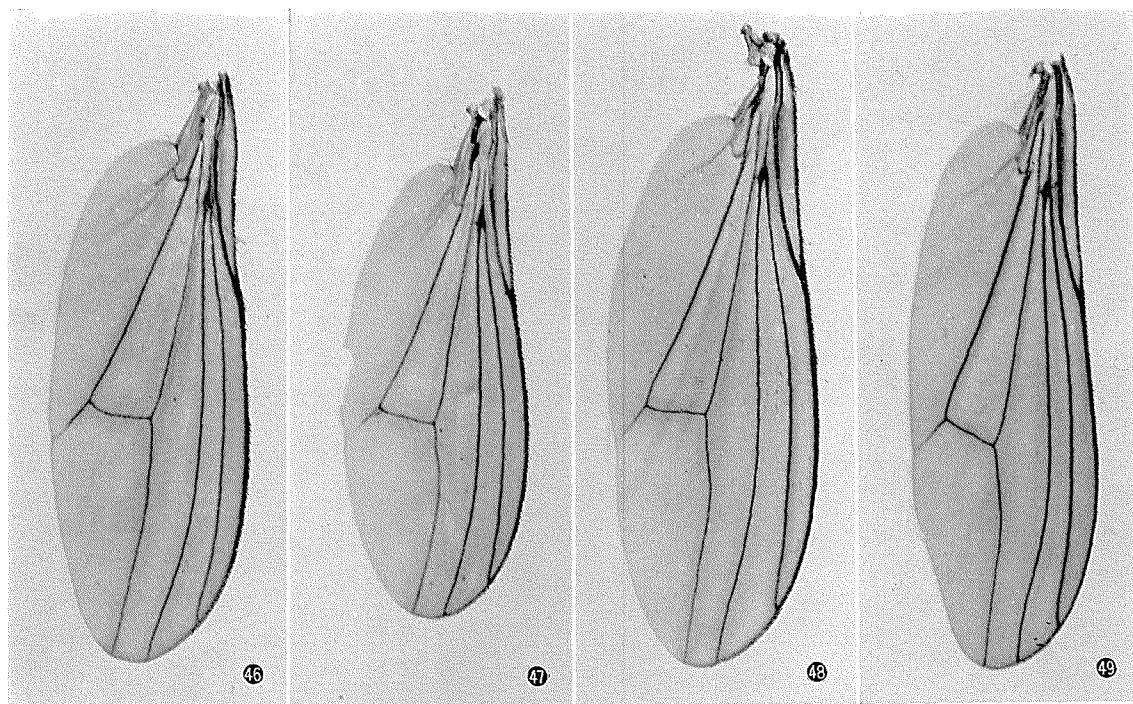


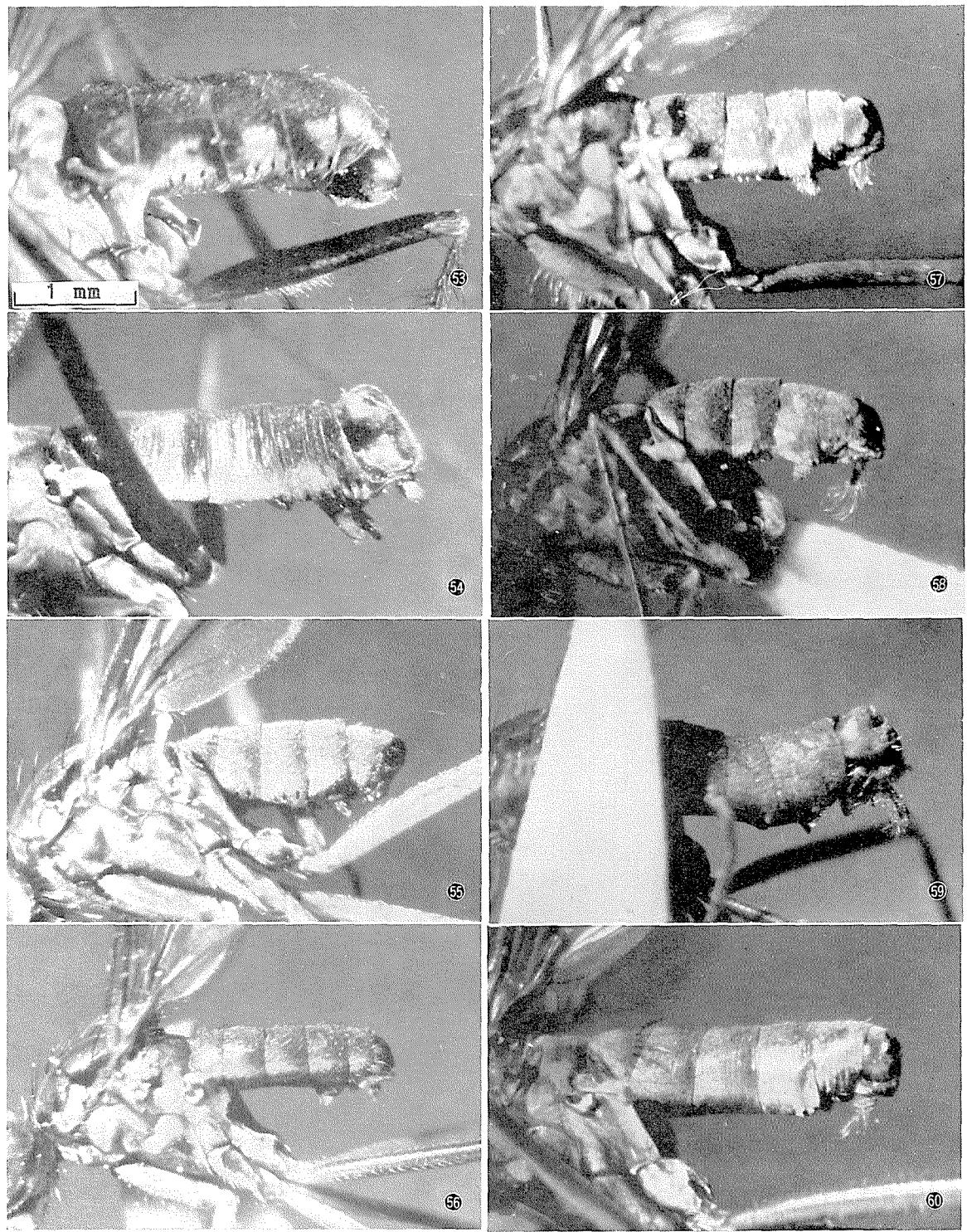


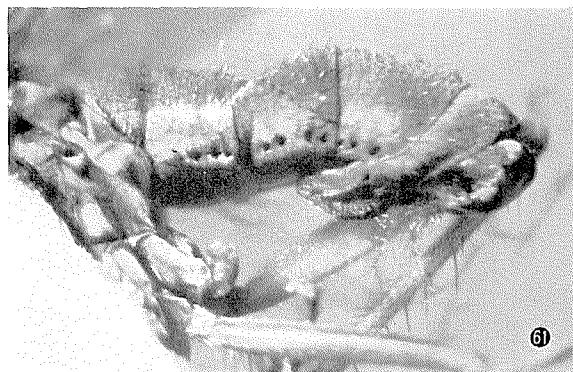








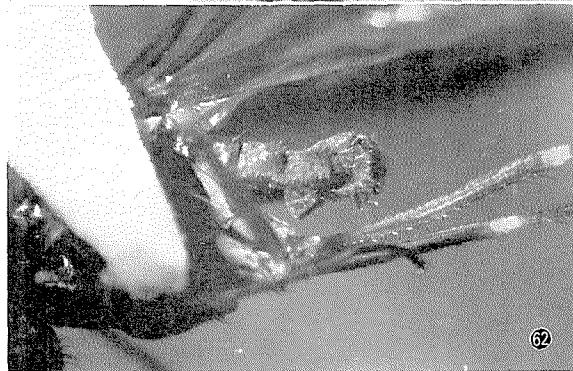




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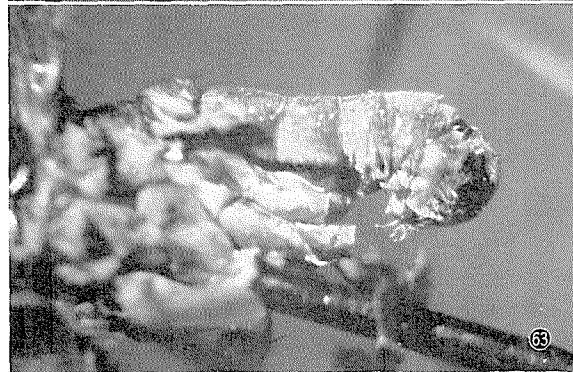
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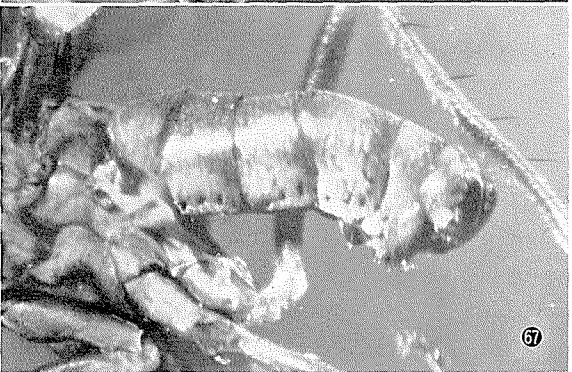
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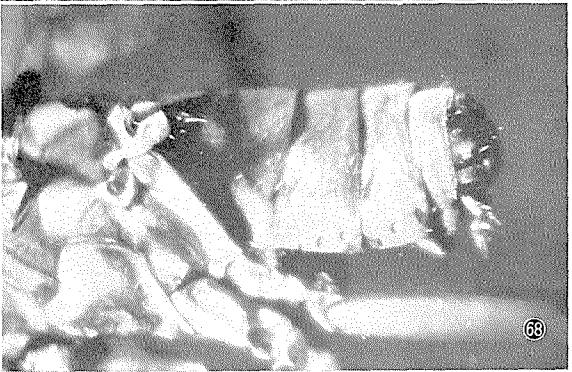
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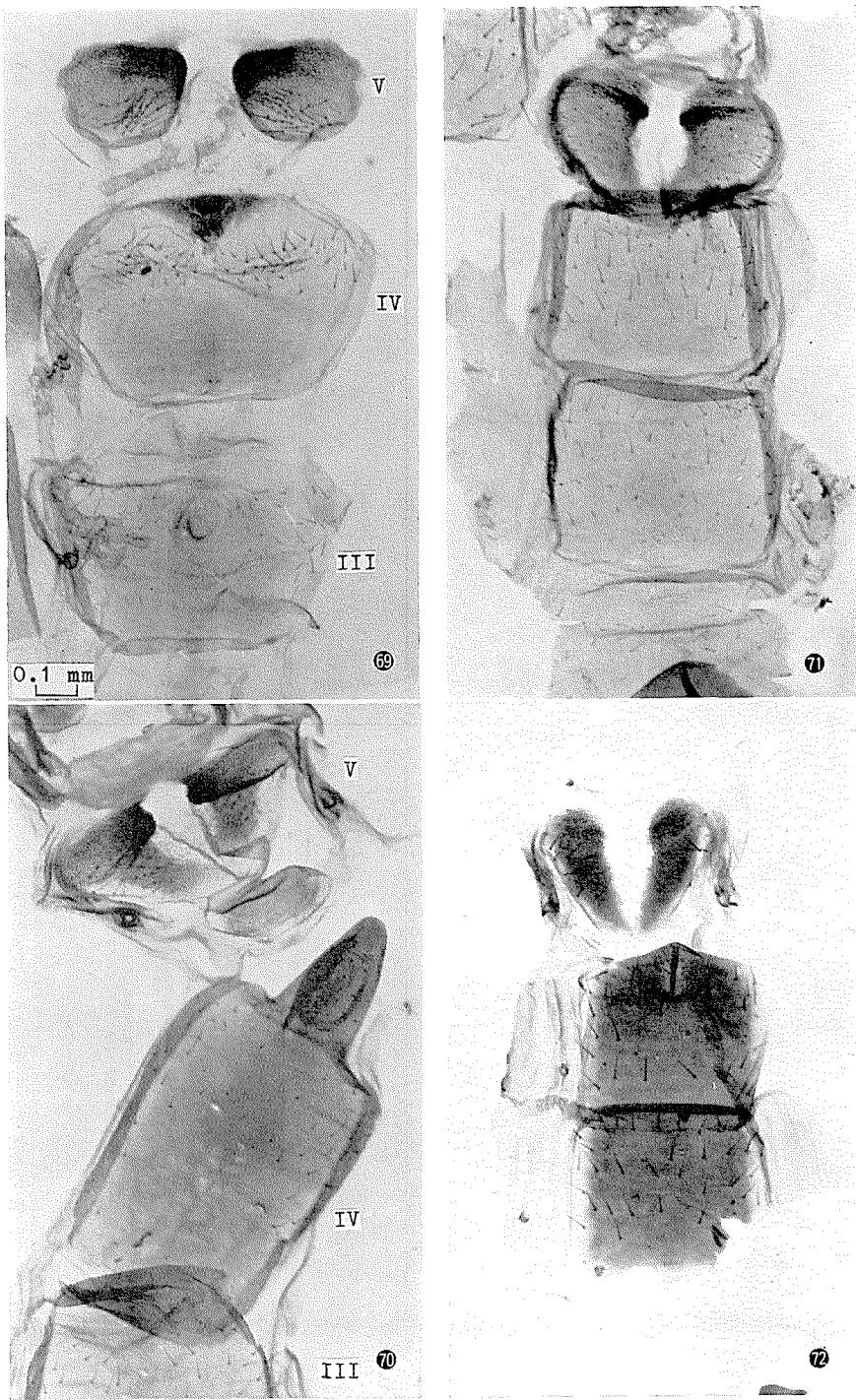
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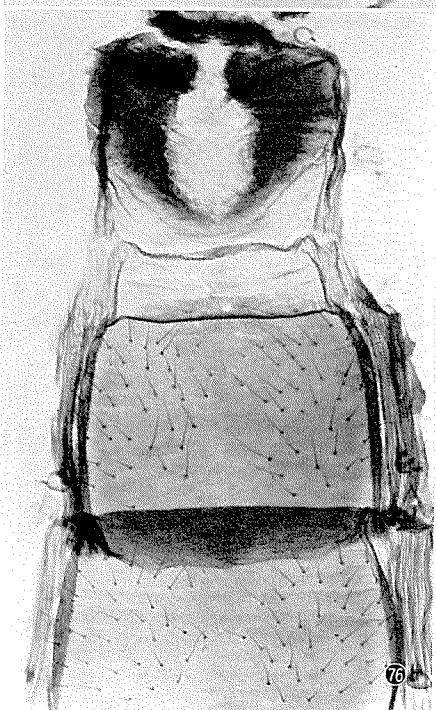
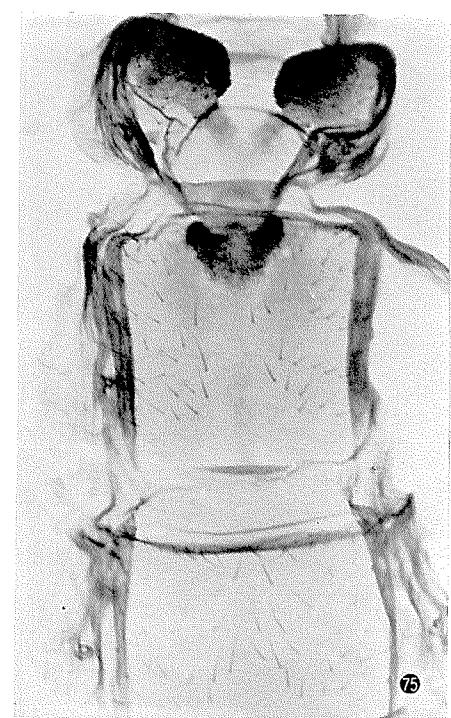
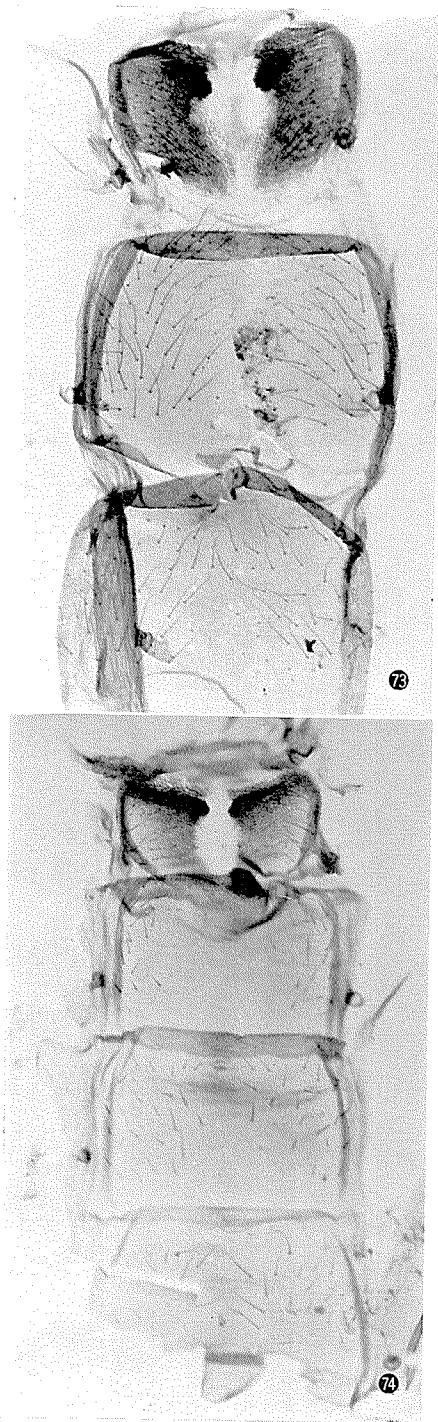


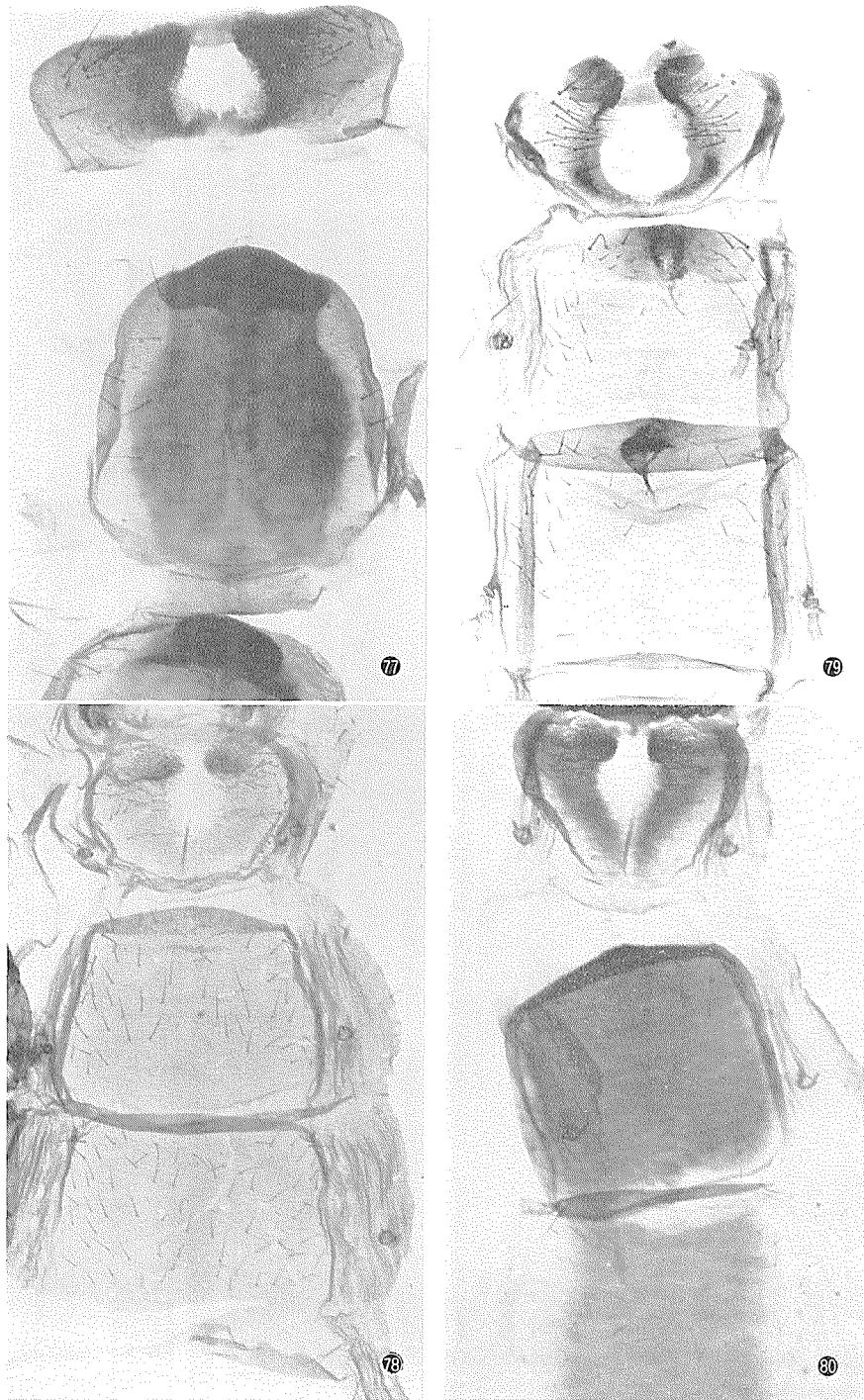
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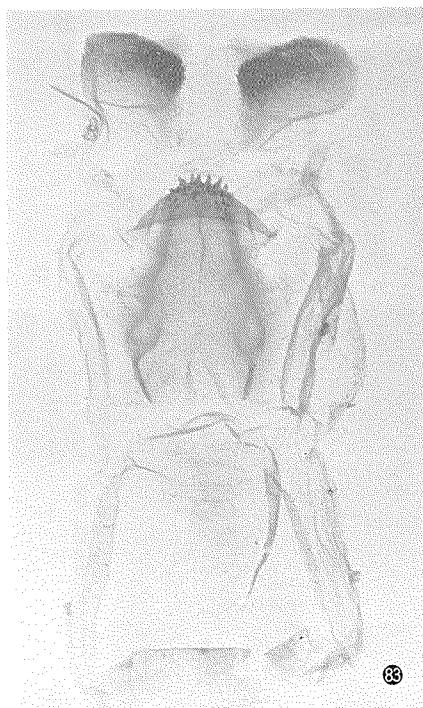








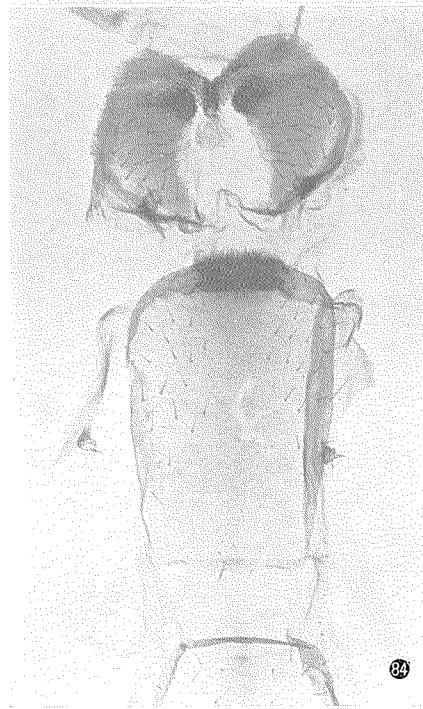
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